CIO

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COVER STORY

Old World, New Order

How Barclays' Yank Helped The British Bank Overhaul Its IT Strategy

ALSO INSIDE

Accelerating Times On The Bandwidth Bandwagon

The Barclays Group's
Joseph De Feo

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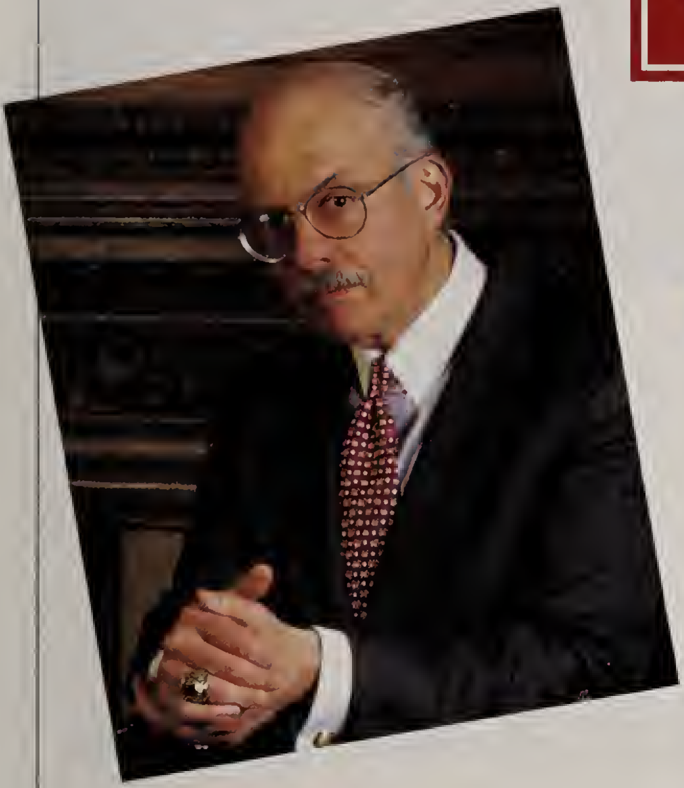

COVER STORY

FINANCIAL SERVICES 44

The Changing of the Guard

Britain's largest bank is steeped in tradition. But the Barclays Group recognized the need to embrace change—and IT—to prepare for a fully wired future.

By Elizabeth Heichler

Banking on IT **44**
Cover photo by Peter Jordan/
Liaison International

Get smart **32**

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KNOWLEDGE MANAGEMENT 32

Experts for Hire

Most companies need help tapping into intellectual capital. Teltech not only offers access to experts and databases with the information clients want, it provides human guides to get them there.

By Carol Hildebrand

Broadband bound **52**

ENTERPRISE NETWORKING 52

Entering the Fast Lane

As bandwidth-hungry applications such as groupware, imaging and EDI become increasingly common, more and more companies are feeling the need for high-speed communications. Whether their broadband efforts are still in the early stages or fully implemented, IS executives agree that planning for the future is critical.

By Mickey Williamson

MORE ►►►

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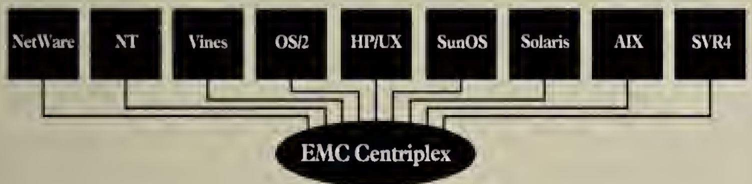

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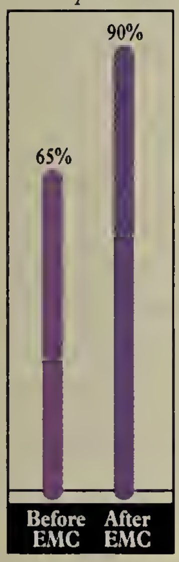

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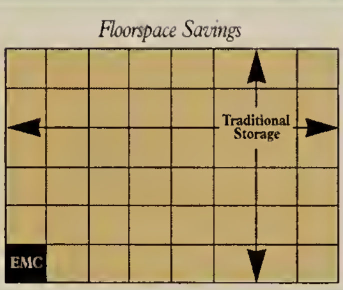

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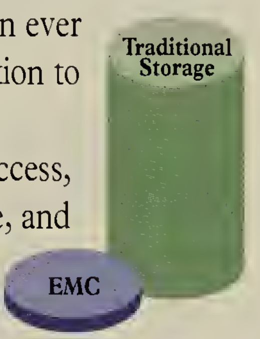

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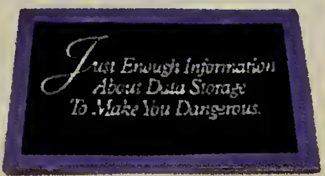
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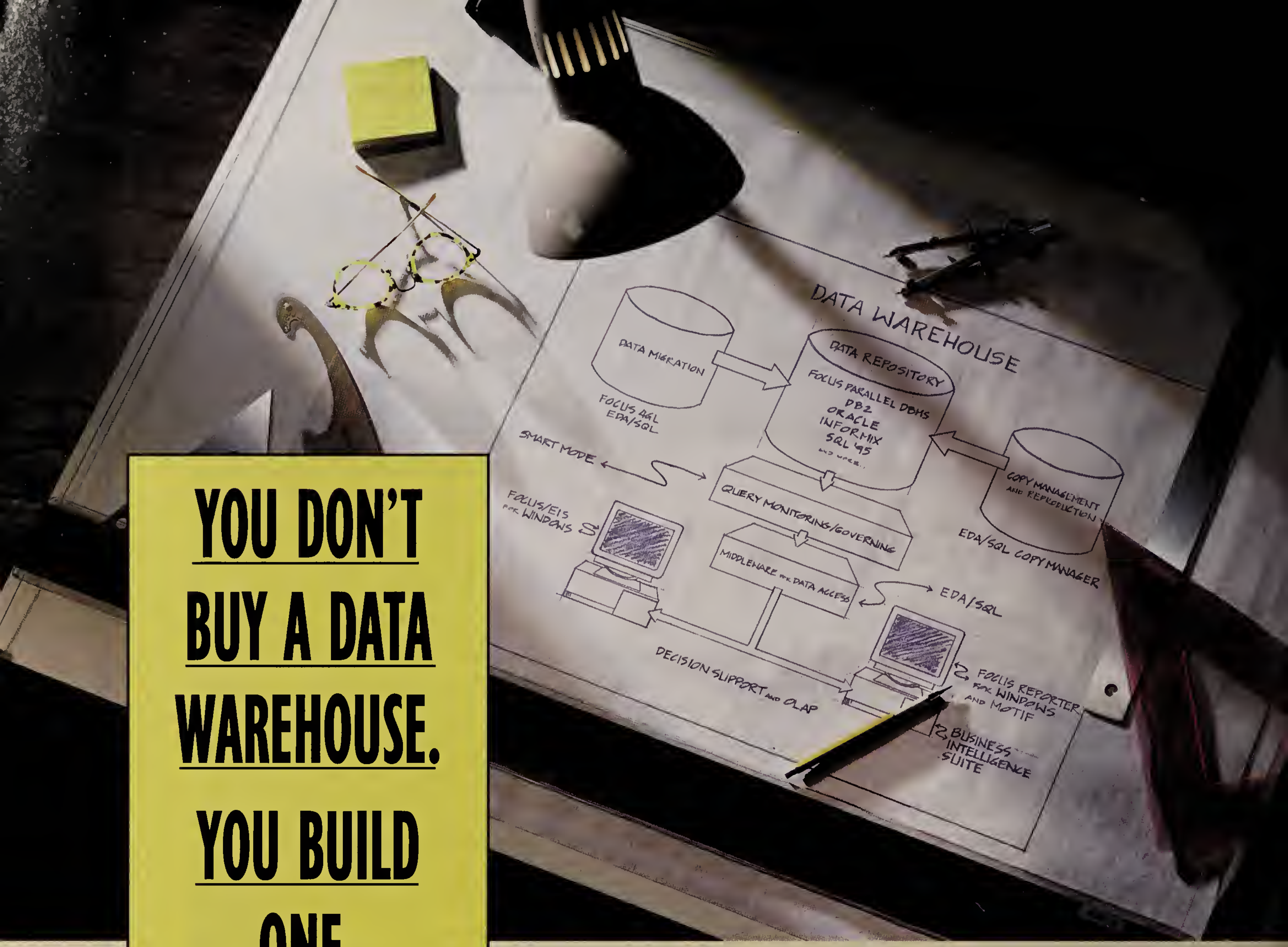
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Acquiring minds **60**

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A New Purchase Order

Harvard professor Steven Kelman holds that excessive regulations are the real cause of the government's procurement woes. Now director of the Office of Federal Procurement Policy, his mission is to make the government's acquisition process look more like the model used in corporate America.

By Leigh Buchanan

An inside job **26**

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INSIGHTS: ALL TOGETHER NOW

Sometimes if you want something done right, you just have to do it yourself. And if you also want it done on time and under budget, you might have to break the rules.

By Anne Stuart

Speak and ye shall find **70**

VOICE TECHNOLOGY 70

STATE OF THE ART: FREEDOM OF SPEECH

Advances in voice technology and falling prices in the speech-recognition market could make voice response applications for the telephone more prevalent. And talking to your computer may soon signal a gain in productivity, not loss of touch with reality.

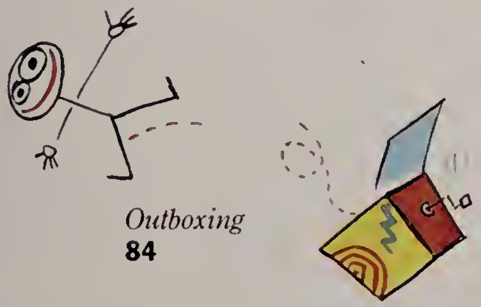
By Dennis Livingston

PUNDIT IN RESIDENCE 84

CIO LIGHT: OUT OF THE BOX (AND INTO THE FIRE)

The pace of change has gone into hyperspeed and you can't keep up. But wait! Before you turn that power tie into a noose, try Ezra's Business Seminars for Busy Busy Businesspeople. It probably won't kill you.

By Ezra Poundcake



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When talk this spring turns to baseball, CIOs ought to keep a sharp eye on three curveballs coming their way. These major league—not replacement—curveballs will affect your technology infrastructure and the strategic business operations built upon it, if they haven't already.

The first is pressure to increase bandwidth. In "Entering the Fast Lane" by Contributing Writer Mickey Williamson (see Page 52), telecommunications consultant Tom Nolle says new ways of doing business and the need to move huge files from point to point have put many companies under pressure to upgrade their networks to meet demands for higher bandwidth.

Some corporations, particularly in the fast-changing financial-services and health-care industries, have already beefed up their information-transfer capacity. But most companies haven't made the investment. CIOs at those companies need to do two things now: consider the business needs and applications of the future, and then explore broadband-technology options. The actual upgrading—if required—can wait.

The second curveball is deregulation. In Great Britain as in the United States, deregulation is helping to change dramatically the face of the financial-services industry. Amid this environment of change, Barclays PLC, Britain's largest bank, has just overhauled its technology strategy and organization. (Please see "The Changing of the Guard," beginning on Page 44.) The objective: to align the bank's IT organization with its business goals. The result: Barclays is now positioned to exploit new business opportunities and deliver enhanced customer services.

For instance, Barclays is actively involved in exploring new electronic delivery channels, including multimedia-based kiosks and interactive CD-based technology that enables home shopping and home banking. Internally, Barclays is experimenting with imaging to improve check-clearing procedures and has successfully applied artificial intelligence to reduce credit-card fraud (saving the bank nearly $5 million in two years). That's just the beginning. In the next six years Barclays plans to spend about $2.4 billion on strategic IT applications.

The third curveball is knowledge management. Information resides in different places and flows in unusual ways in today's horizontal organizations. The new corporate challenge, writes Senior Writer Carol Hildebrand, is to manage elusive organizational knowledge and transform it into business innovation (see "Experts for Hire," a profile on intelligence clearinghouse Teltech Resource Network Corp., beginning on Page 32). By the way, technology alone is only half the solution.

Watch these trends closely. Three strikes and you're out.

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CIO

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4. THE NOMINATED ORGANIZATION

Please tell us about your organization (company, business unit, agency) in 500 words or less. Include information on:

- when the organization was founded;
- mission statement;
- major products and services;
- markets served;
- any other data you believe to be relevant in terms of general background.

5. THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its importance to the organization by completing the following sections. Please limit your material to five pages.

- **OBJECTIVE**: Identify the primary business objectives of the IT investment.
- **SCOPE AND IMPACT**: Identify the functions (e.g., customer service, manufacturing, planning) that were changed by the system, the nature of those changes and their impact on the business. Identify other business-change initiatives tied to the IT investment.
- **ADDED BUSINESS VALUE**: Describe how the technology investment is furthering the organization's strategic objectives, including any new business initiatives. Note any significant event that would help us evaluate the nominated system's value. Examples might include a merger, a new distribution channel or a significant regulatory change.
- **THE IMPORTANCE OF IT**: Identify the different components of the overall business change (e.g., business reengineering, downsizing, cycle times). Explain the importance of the IT component to the overall business change. Could the results have been achieved without IT?
- **COLLABORATION**: Describe how the business unit and IS organization worked together throughout the project—from concept to implementation. What were the specific tasks fulfilled by the business unit? IS organization?

6. QUANTIFYING ROI

Please provide a detailed summary of the nominated system's investment costs (including all up-front development expenses and annual maintenance charges) and its ROI to date. Include reasonable estimates of indirect and /or "soft" benefits.

7. TECHNICAL PROFILE

Briefly describe the technology of the nominated system. Please include the names of major vendors and products. If you prefer, you may attach a document containing a technical description of the system, providing it is no more than five pages.

NOTE: The examples provided here are meant to be illustrative, not all-inclusive:

- Architecture (e.g., client/server, distributed, mainframe)
- Hardware (e.g., mainframe/parallel processor, minicomputer/server, desktop computers, handheld/portable devices)
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- Networking/communications hardware, software and services (e.g., modems, routers, electronic-mail packages, carriers and public networks)

8. TRUTH OF INFORMATION/RELEASE

The following release must be signed by both nominating executives if the application is to be considered. *Unsigned releases will invalidate the entry.*

I HEREBY STATE that the information provided is true and complete to the best of my knowledge and belief.

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I RECOGNIZE that failure to meet these conditions or to provide sufficient material that can be published can cause the application to be rejected at any point in the process at the sole discretion of the sponsors.

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☐ VENDOR
☐ OTHER (PLEASE IDENTIFY) ______________

CHECKLIST

HAVE YOU FILLED OUT...?

☐ Company/Business-Unit, Entrants and Supporters Information

HAVE YOU INCLUDED ON SEPARATE PAGES...?

☐ Nominated Organization
☐ Nominated System
☐ Technical Profile
☐ Additional Return on Investment Material

HAVE BOTH ENTRANTS SIGNED AND DATED...?

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ENTERPRISE VALUE AWARDS TIMELINE

APPLICATION DEADLINE: July 1, 1995

JUDGES SELECT WINNERS: October 1995

ANNOUNCEMENT OF WINNERS: October 16, 1995

AWARDS CEREMONY: February 6, 1996 at the *CIO* Enterprise Value Summit

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3. A partnership between an IT and business executive

If your innovative solution meets the above criteria, please fill out this Enterprise Value Awards application form. The February 1, 1996 issue of *CIO* will feature profiles of the winning organizations and the executives who have proven their strategic technology investments have had a positive and sustained impact on enterprise value.

On February 6, 1996 CIO will host a special awards ceremony honoring the winners at the annual *CIO* Enterprise Value Summit. If you would like to learn more about the *CIO* Enterprise Value Awards program, please call Tracey Grogan at (508) 935-4449.

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CIO Communications Inc., 492 Old Connecticut Path, PO Box 9208, Framingham, MA 01701

PHOTO BY WEBB CHAPPELL

> *"Everybody wants to connect to everybody else, no matter where they are. If people really want an information superhighway, I think you'll see ATM down to the desktop someday."*
>
> *–Carroll Lairamore*
> *Manager of Telecommunications Integration*
> *Oklahoma Gas and Electric*

Information delivery has evolved quickly in the last decade. In a short time we saw overnight delivery and faxing become standard protocols of business efficiency. (What did we do before? Oh yeah, wait two to five days for postal delivery.) Swapping information simply requires a modem and an e-mail package. And now your desktop computer can fetch information from anywhere around the globe.

What's next? Companies that have a critical need to send and receive real-time data, receive millions of incoming calls a year or utilize digital voice and image technologies should be taking a serious look at an ATM migration path. With asynchronous transfer mode still in its infancy, many companies may overlook its importance for the years to come. Caroline Michel, senior analyst at International Data Corp., suggests that CIOs conduct a thorough analysis of present bandwidth use and project what future applications are likely to require. Michel is one of many experts who offer their advice in this month's feature article on broadband networking (see "Entering the Fast Lane," beginning on Page 52). The story explores the pros and cons of migrating to broader bandwidths and presents three case studies on network expansion.

One day in the future, we'll look back and wonder how we managed our businesses before ATM.

P.S. Get the recognition you deserve. The Enterprise Value Awards program is open to any IT- and business-executive team that has enhanced business value through an innovative application of information technology. See the application form following Page 8 of this issue.

Coming In CIO

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Personnel Computing

The traditional human-resources department is being transformed, thanks to technology such as kiosks, voice response, resume scanning and workflow applications. Whereas previously much of the department's time was occupied by paper-pushing administrative chores, today these tasks are being outsourced or offloaded to employees via self-service technology. The result: HR is free to be more of a strategic player in the organization.

• •

Net Future Value

Beset with a phenomenal and much-publicized growth rate, can the Internet carry the load that is now being placed upon it? *CIO* will look at the Internet's infrastructure—a loose aggregation of many thousands of computers worldwide that lacks any form of central governance—and reckon how it will fare relative to users' ability to develop bandwidth-greedy applications that sap its capacity.

• •

What's in a Name?

What's a chief technology officer? Nobody seems sure. In a few organizations, the CTO is simply the CIO by another name. At others, the CTO plays a much bigger role on the business side than the CIO ever did. And at still others, the CTO rarely ventures out of IS. CTOs remain a relatively rare breed, but some consultants predict their ranks will grow rapidly over the next five years. We'll try to pin down this position, including how it compares with the CIO and how it can affect the organization.

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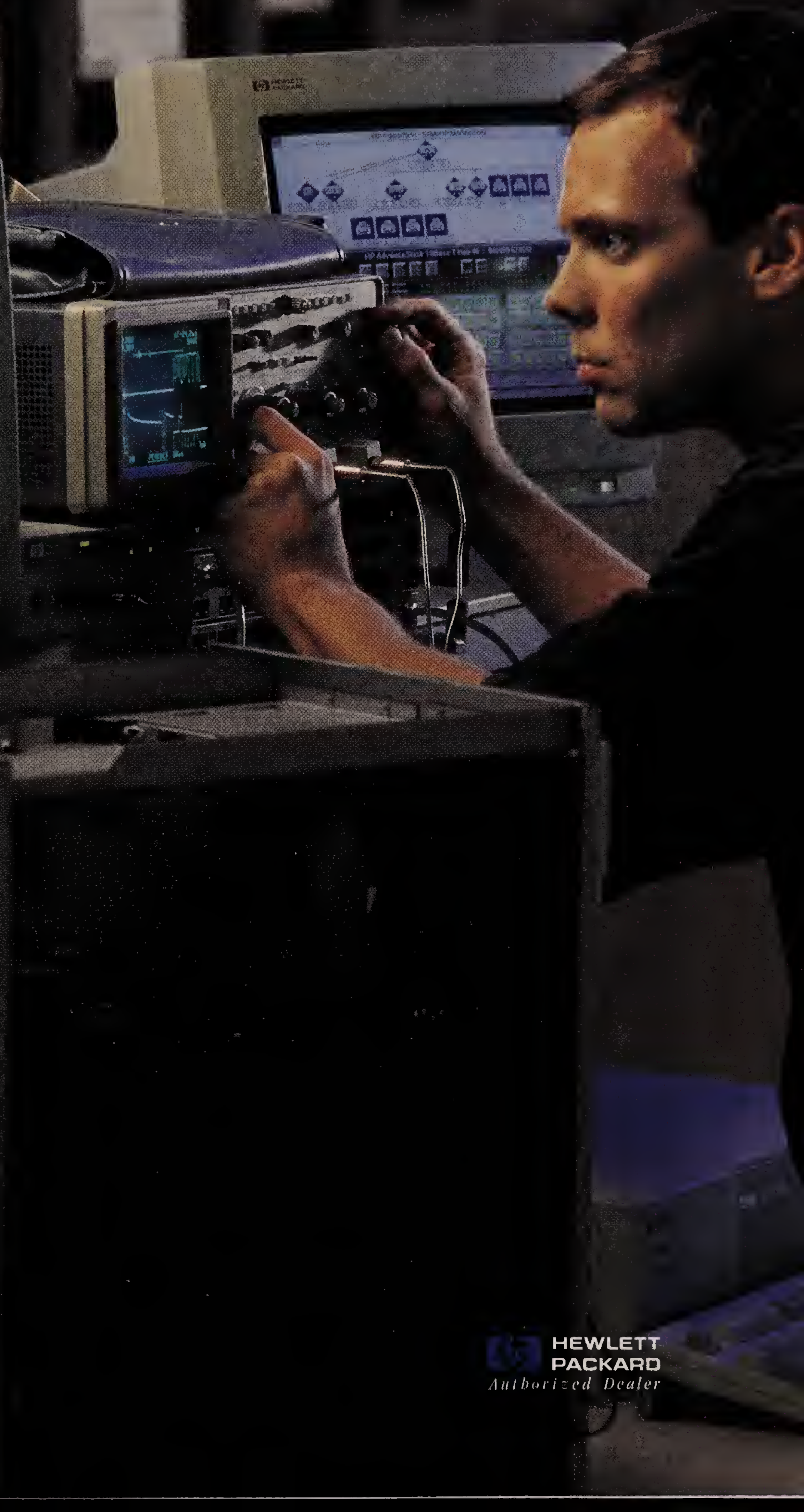

When you're investing this much in information systems, you can't afford even calculated risks. That's why we've engineered quality into every phase of our business.

Especially our 135,000-square-foot MicroAge Quality Configuration Center, where we assemble, configure and test more than 700 systems each day, adhering to the most rigorous quality standards. This precision not only earned ISO 9002 certification — the highest international quality standard — it earned the confidence of some of the world's largest companies.

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Introducing the new Compaq Deskpro

HAVE COMPUTERS BECOME MORE HUMAN? WELL, THIS ONE CAN TELL YOU WHO IT IS, WHAT IT'S DOING, AND HOW IT FEELS.

Managing computers on a network requires knowledge, skill and a bit of intuition. Okay, a lot of intuition. Somehow, you have to know what's going to happen. Before it actually happens.

Wouldn't it be great if you had just a little help? A crystal ball? A sixth sense, perhaps?

Funny, we were thinking the same thing. Which is why we built the new Compaq Deskpro.® A computer that can actually send a report of its status directly to the desk of the network administrator.

Imagine being warned before a hard drive on another floor (or another city) seized up. Or taking a complete PC inventory right from your desk. (Certainly not the kind of cooperation you'd expect from a machine.)

We call it Intelligent Manageability. You'll likely call it "I'm glad someone finally thought of that."

How do we know? Maybe it had something to do with intuition.

COMPAQ

COMPUTERS THAT TAKE CARE OF THEMSELV

Research proves what you've known all along: only 20% of the lifetime cost of your company's PCs is the initial cost.* The other 80% comes from all the things you do to manage them—like configuring, servicing, upgrading and just keeping track of who's got what. Isn't it time someone found a way to change that?

Asset Management 101. Our newest Compaq Deskpro is the first PC that's as concerned about cutting costs as you are. It all starts with the Intelligent Manageability we mentioned a page ago: a Compaq-designed combination of hardware and software that gives you a new level of control over your networked PCs.

Until now, taking stock of your PC assets has always required you to physically visit your computers one at a time. At every stop, you'd have to examine the PC, take serial numbers, check software, open it up and take a look inside. It's a process that could literally take days.

The new Deskpro changes that. Working closely with the leading companies in the world of LAN management, we built in some powerful features that can be tapped by their new software tools.

And the result is stunning: Now, as network manager, you can look into a Deskpro PC anywhere on the network to take inventory. You can retrieve hardware specifications, including make, model and serial number for the PC, hard drive and monitor, and revision numbers for the system board and ROM. You can also identify system software and drivers.

It's not only good knowledge to have. It makes the job of maintaining and updating PCs vastly more simple.

Fire prevention. When people decide to stop working for you, they usually have the courtesy to give notice. Computers, on the other hand, seem to enjoy the element of surprise.

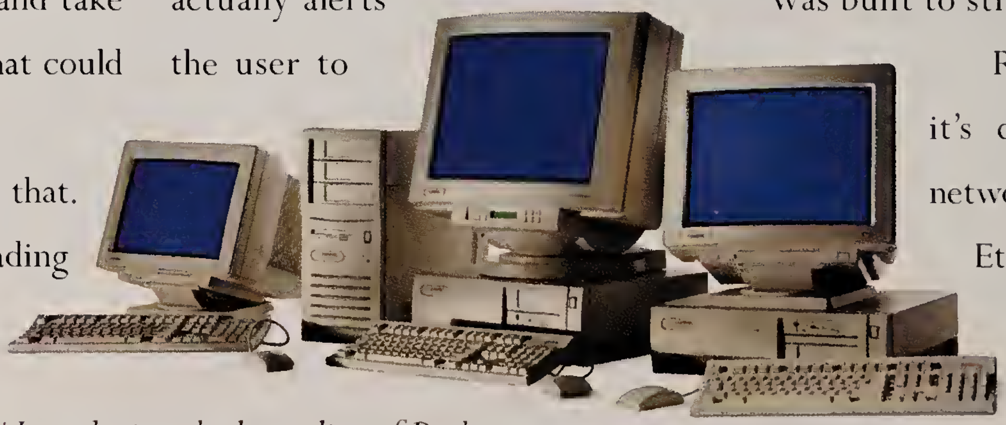
Again, Deskpro will be changing things. Its Intelligent Manageability actually alerts the user to critical potential problems before they can turn into real ones.

Every time you power up the new Deskpro, its IntelliSafe™ hard drive conducts its own diagnostics. If any of its performance parameters has fallen below acceptable standards, the user is notified. So instead of responding to an emergency, you have ample time to take corrective action—replacing the drive at no expense under the Compaq Pre-Failure Warranty.™

In addition, our Environmental Fault Protection constantly monitors the internal temperature of your Deskpro to make sure it isn't working under conditions which might imperil your valuable data.

Networking is in our blood. Because setting up a personal computer on a network has turned into one of the most time-consuming pastimes in corporate America, the new Deskpro was built to streamline the process.

Right out of the box, it's configured for your network, with a 32-bit PCI Ethernet NIC or an IBM Token Ring adapter



Introducing the latest line of Deskpro computers

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* Source: Gartner Group

COMPAQ

s? This Could Take Some Explanation.

already installed. The drivers are optimized and industry-standard connectors are in place. And with its simple configuration tools, Deskpro helps reduce the complexity of setting up desktop network software.

Under the hood. The thing that makes our Intelligent Manageability most appealing, of course, is the fact that it's built into an enormously powerful and efficient computer.

With Deskpro, you can choose your processor, from a DX2/50MHz to the most powerful Pentium. And every model delivers the enhanced performance of Compaq's new TriFlex™/PCI architecture. In fact, in our latest crop of Deskpro PCs, higher performance is something you can literally see and hear.

Thanks to PCI local bus graphics, you get crisp, responsive graphics even in everyday business applications. (Select 586-class Deskpro models are available with higher-performance VRAM graphics.)

In multimedia models, you get the speed of our new QuadSpeed CD-ROM and the CD-quality sound of built-in Enhanced Business Audio.

Open and accessible. Needs change, goals change and people change. The good news is, a Deskpro computer can change every bit as quickly.

It opens without any special tools. The system board slides out, making it easy to upgrade the processor or add extra RAM. The PCI expansion slots are easily accessed. And the drive cage swings out to make hard drive upgrades painless.

Plus, the Deskpro system board utilizes Flash ROM technology, which allows you to make future upgrades at the board level simply by running a software utility.

With the task of upgrading a PC reduced to minutes, you can allocate your time to more lucrative pursuits.

Future dividends. And then there are the benefits your business will be reaping down the road.

Since all Deskpro models have been designed with built-in power management features that meet the EPA's stringent requirements, they can actually consume less power.

(The savings in a month from a single Deskpro probably won't finance your retirement villa, but the savings from many machines over many years should have a nice effect.)

And when Windows 95 becomes available, Deskpro will make the job of managing your company's network of PCs even easier.

Using new management software tools provided by Compaq and our LAN industry partners, you'll be able to effectively monitor the health of all your networked Deskpro PCs—including the ones hard at work in your outpost six time zones away—without having to leave your desk.

You'll be able to configure your Deskpro so that if IntelliSafe hard drive failure becomes a possibility, it will send you a distress call across the network. Or automatically safeguard its data on a tape backup.

You'll even be able to have Deskpro send remote notification if it should detect potential problems with its built-in network interface card or internal operating temperature.

But then, what do you expect from a computer that takes care of itself?

As with all Compaq PCs, Deskpro is covered by our free 3-year limited warranty. For more information on our full line of Compaq desktop PCs, call us at 1-800-345-1518 or reach us on the Web at www.compaq.com. In Canada, we can be reached at 1 800-567-1616. ©1995 Compaq Computer Corporation. All rights reserved. Compaq and Deskpro registered U.S. Patent and Trademark Office. IntelliSafe and TriFlex are trademarks and Compaq Pre-Failure Warranty is a service mark of Compaq Computer Corporation. Some features available with Compaq Deskpro and independent software applications. Other features only available with Windows 95. Pentium is a registered trademark of Intel Corporation.

TRENDLINES

ORGANIZATIONAL INNOVATION

RESPECTING THE REBEL

Independent thinkers can achieve great success as entrepreneurs, but in many cases their temperaments can hinder them from reaching the upper rungs of the corporate ladder in someone else's company, a recent study suggests. Researchers at Pennsylvania State University have found that team players who adapt well to the prevailing corporate culture are more likely to be promoted than free spirits who swim against the current. Yet what's good for these conformists' careers may not be good for the company: Some experts warn that having too many team players in the top ranks can squelch innovation.

As part of the study, students in a nationally ranked M.B.A. program took a test that measures their tendency to self-monitor their behavior. Five years after graduation, those who scored high on the test were more likely to be promoted within their companies and land better jobs elsewhere than those who scored low. These results indicate that people who adapt their behavior to the prevailing corporate social norms have an edge over mavericks in clawing their way up the ladder.

The findings are probably no great revelation to anyone in the corporate world, but they have important implications nonetheless for companies as well as individuals. Large corporations may be harmed by having too few risk takers in their upper ranks, according to Harry Levinson, a psychologist who is chairman of The Levinson Institute, a Waltham, Mass., management consultancy. Promoting and rewarding only those who adhere strictly to the party line can lead to a groupthink that stifles innovation. IBM, General Motors and Digital Equipment are examples of firms where this phenomenon has hurt the bottom line, he asserts.

Few companies excel at fostering internal innovation, Levinson says. There are indications, however, that some are placing a higher priority on encouraging creativity. Even IBM may be changing its ways: Levinson cites a recent *Business Week* article describing Big Blue's elevation of a small division that developed a large-scale parallel-processing machine using off-the-shelf parts to deliver mainframe power in a compact, relatively inexpensive package. The division acted like an entrepreneurial organization within bureaucratic IBM. Chairman and CEO Louis V. Gerstner Jr.'s elevation of the division and promotion of its manager sends a clear signal that successful innovation will be rewarded, Levinson says.

What does a company need to do to promote innovation? For starters, there has to be a sense of openness and the feeling that those who come up with new ideas will be heard, Levinson says. In addition, the organization should have some way of supporting ideas, and that doesn't mean just having a committee that turns

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COSTS PLUS PRICING

It's easy to calculate the price of a new PC, but estimating the hidden costs that will be associated with it has always been a challenge. According to a recent report from Forrester Research Inc., management overhead accounts for almost 50 percent of the total cost of PC ownership, amounting to $3,830 per PC each year in the average Fortune 1000 firm.

The Cambridge, Mass., market researcher cites the battalions of desktop administrators needed for configuration management, software version control and trouble-shooting as the source of these extra costs. And as the prevalence of remote computing and telecommuting increases, the problem will just get worse, Forrester contends.

However, Forrester also predicts that by 1998, companies will be able to reduce the costs of managing a PC by more than 50 percent thanks to improvements in operating systems, the emergence of integrated management tools and the acceptance of new standards.

For information, call 617 497-7090.

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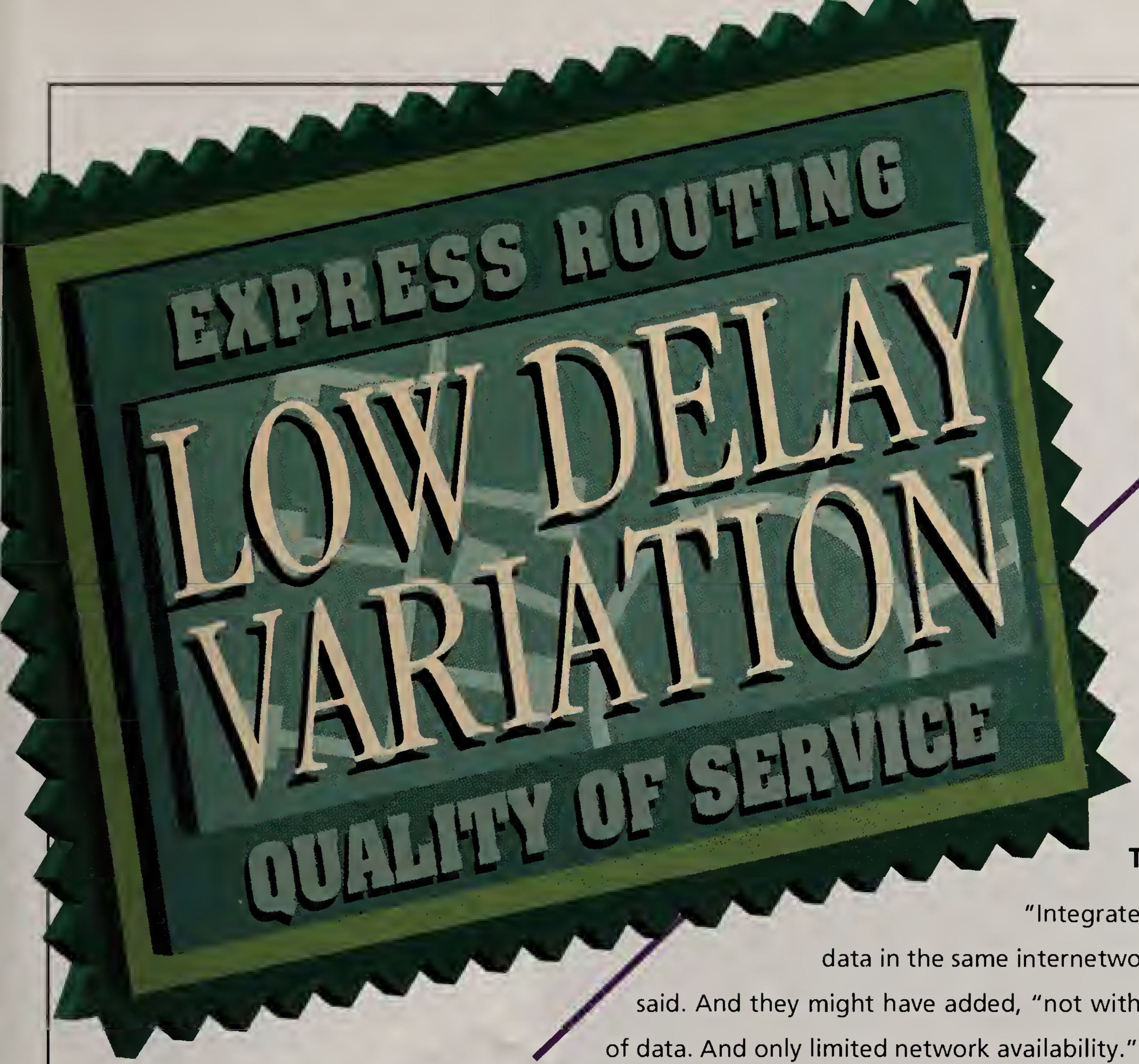

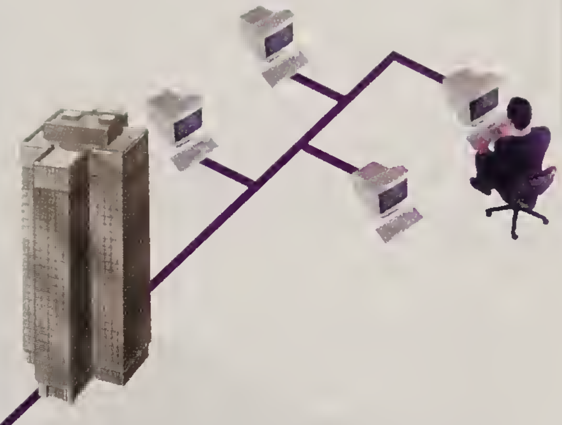

They Said It Couldn't Be Done.

"Integrate the older protocols with today's LAN data in the same internetwork? Not without serious delays," they said. And they might have added, "not without delay variations, either. And loss of data. And only limited network availability."

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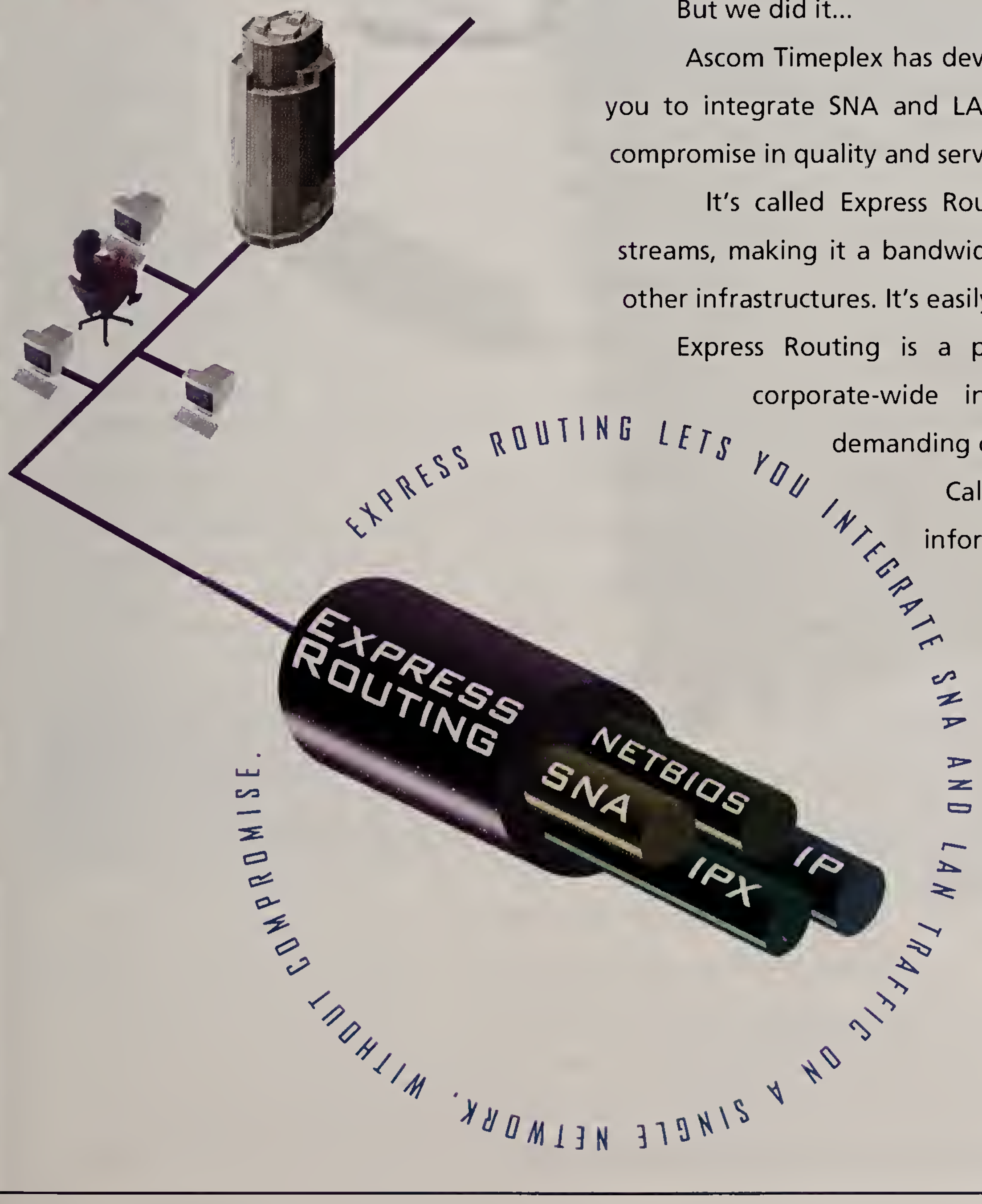
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thumbs up or down on new proposals. There should be a system to support pilot activities to test new ideas.

In addition, there should be a method for reporting failures so that they can become tools for learning. Likewise, all success stories should be widely available, so anyone within the company can find out how they emerged and were developed. "It's easy for people to feel threatened or envious [of others' successes]," Levinson says. Getting insight into notable corporate achievements can remove the mystique, make them less threatening and even inspire others to innovate. Although "it's important to celebrate innovative success, be careful not to reward a single person if a group was involved," Levinson warns.

Managers should take the initiative in touting success stories, Levinson suggests, and encourage innovators to present that work before industry trade groups and other organizations. "A company that fosters innovation ought to take public pride" in its achievements, he says.

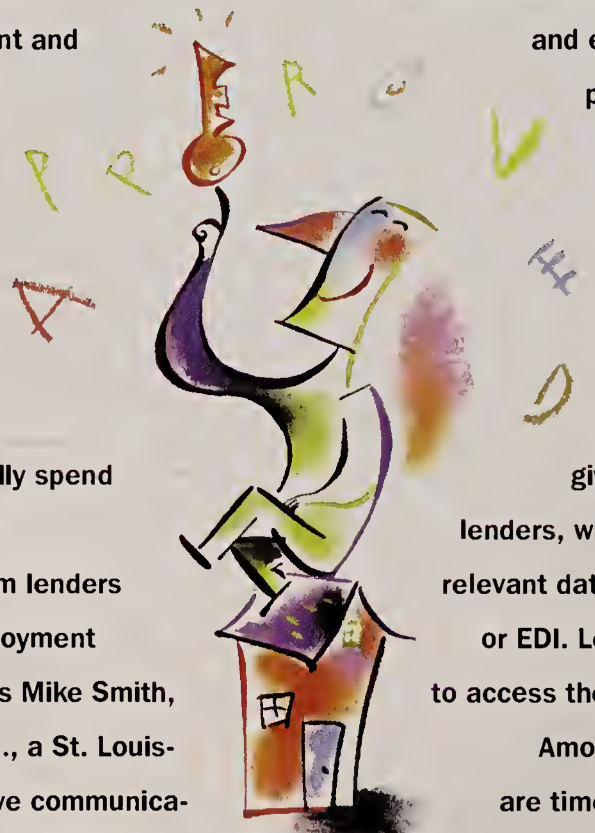
–Peter Fabris

ONE FOR ALL

When people apply for mortgages, loans or even apartments, lenders and landlords invariably contact their bosses to verify employment and salary information. It may not seem like a big deal, but for a company with many employees, the time involved to process these requests adds up.

"Large companies typically spend hundreds of hours monthly responding to requests from lenders and others to confirm employment history and salary," explains Mike Smith, vice president of TALX Corp., a St. Louis-based provider of interactive communications products and services. TALX estimates that the processing costs can amount to $3 per request.

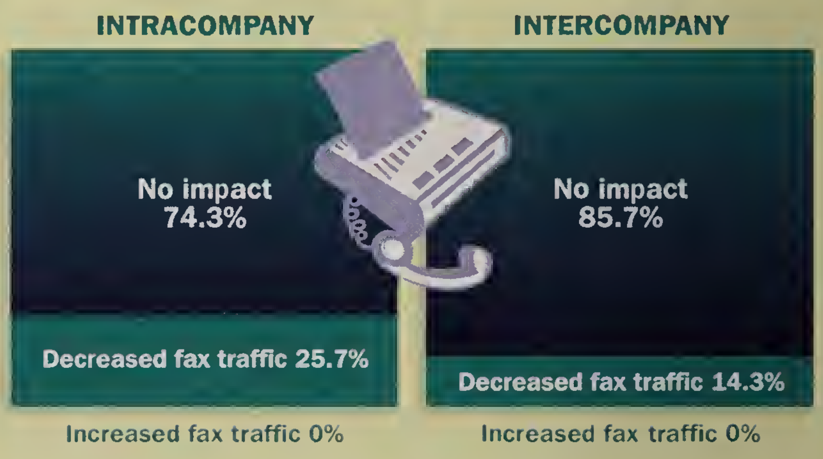
A new service from TALX, called The Work Number For Everyone, automates this task, thereby freeing HR and payroll employees to concentrate on their primary functions. Participating companies provide their employment data to TALX, which maintains the service and equipment. Employees applying for loans or credit first call TALX for an authorization code using their Social Security number, a PIN and their employer's company code; they then give that number to lenders, who use it to access the relevant data securely via voice, fax or EDI. Lenders pay a nominal fee to access the information.



Among the benefits TALX cites are time and dollar savings; increased accuracy and consistency of the information relayed; improved security of employment data; faster credit-request approvals; and the ability to shift cost responsibility for this process to those seeking the information. Call 314 434-0046.

HAS E-MAIL AFFECTED YOUR FAX TRAFFIC?

Percentage of 150 organizations that use e-mail



SOURCE: BIS STRATEGIC DECISIONS

THE FAX REMAINS

E-mail may be increasingly popular as a business communications tool, but that's not at the expense of the fax machine, according to a recent report by BIS Strategic Decisions.

Indeed, almost three-quarters of the 150 companies the Norwell, Mass., research firm studied said that intracompany e-mail does not affect their fax traffic, while more than 85 percent said that intercompany e-mail does not.

"E-mail and fax have inherent advantages and disadvantages," says Judy Pirani, director of image communication systems for BIS. "It is usually easier to e-mail to someone within the same company because of the similar e-mail networks. However, more people feel comfortable [using] a fax machine to [reach] someone outside their company."

Pirani predicts that integration of the two technologies will be the future trend. "People will be sending a message or document in the future and not be aware of how the message is sent."

Call 617 982-9500.

CHART BY LINDA GOLON; ILLUSTRATION BY BETHANY GULLY

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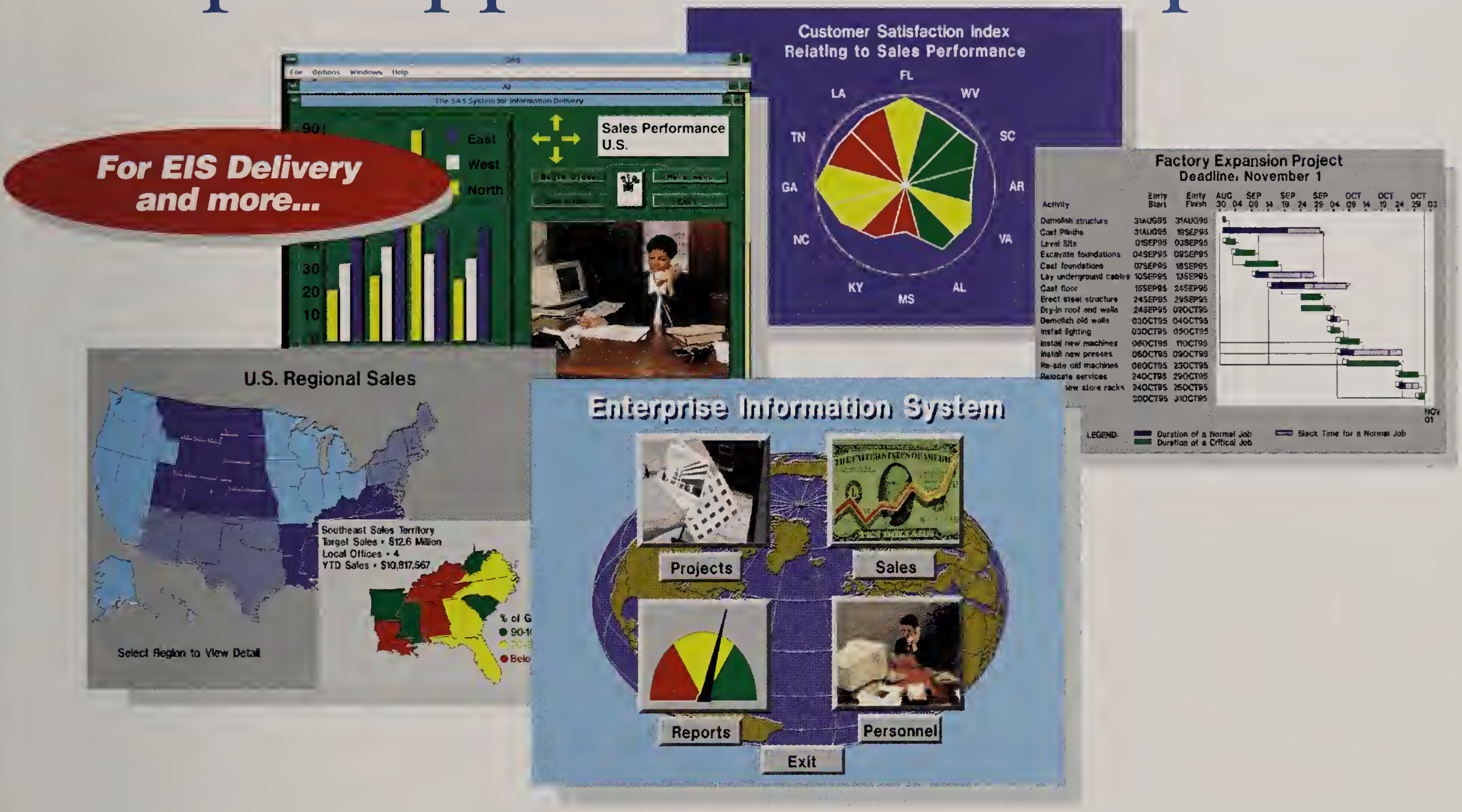
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Activity	Early Start	Early Finish
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Cast Plinths	31AUG95	19SEP95
Level Site	01SEP95	03SEP95
Excavate foundations	04SEP95	09SEP95
Cast foundations	07SEP95	18SEP95
Lay underground cables	10SEP95	13SEP95
Cast floor	15SEP95	24SEP95
Erect steel structure	24SEP95	29SEP95
Dry-in roof and walls	24SEP95	02OCT95
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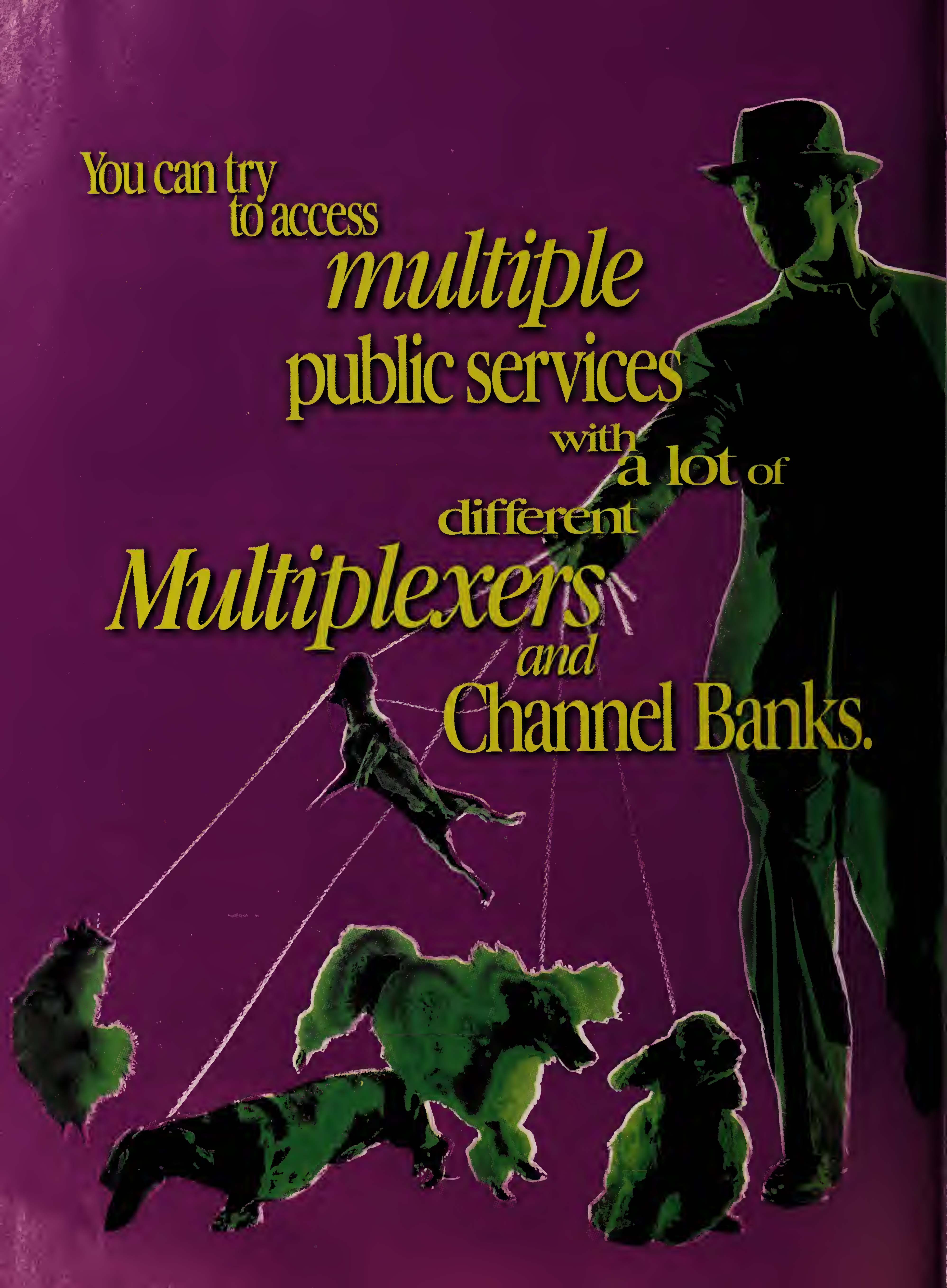
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Once you free yourself from the tangle of multiplexers and lines, you'll want to befriend our new ACCULINK® Access Controller (AAC). It lets you access everything from basic transport and intelligent backbone services to switched digital and voice, ISDN BRI, ISDN PRI and more. All from one very obedient source. And thanks to multiple WAN links, SNMP management and an internal client server architecture, this new breed performs in any environment. It can expand and change as new technologies emerge. And by consolidating LAN, voice and video traffic onto a single or multiple high-capacity T1/E1 line, you'll save on transmission costs, too.

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TRENDLINES

INTERNET FOLKLORE

TRUE LIES

Next time you're driving at night and notice a car with its headlights off, stifle the urge to flash your high beams. A gang-initiation ritual requires would-be members to cruise around lightless, only to trail and kill those who flash their lights. So much for being polite.

That story is one of countless urban legends that's been circulated—and debated—on the Internet. While urban legends can show up in any context on the Net, people who are serious about settling their veracity flock to newsgroups such as *alt.folklore.urban* and the moderated *alt.folklore.suburban*. A recent posting of the gang-initiation myth led to a discussion on the legality of flashing your lights to warn oncoming motorists of speed traps. Some swore they had been ticketed for doing so. Others insisted that police actually invented the gang legend to keep drivers from foiling their speed traps.

"The function of an urban legend is to start a debate," says folklore specialist Bill Ellis, associate professor of English and American Studies at Pennsylvania State University in Hazleton. "The thing that encompasses the legend from the folklorist's point of view is not just the story but all the discussion that follows."

Given the broad reach and chatty nature of newsgroups, the Internet seems an ideal medium for perpetuating urban legends. The story of Craig Shergold (English child with inoperable brain tumor seeks Guinness record for most get-well cards) proves the point and then some. Newfoundland folklorist Anna Kearney Guigné, who studied the case—which is based in truth—for her master's thesis at Memorial University, reports that the boy met his goal of 1,266,000 cards less than two months after his appeal went out via chain letters, fax machines and the Net in 1989. Although the family tried to stop the flow of cards, which Guigné says has now surpassed 100 million, the story lives on—and so does Shergold, thanks to a successful operation paid for by U.S. millionaire John Kluge.

Ellis believes legends spread most quickly when they tap into an undefined threat. "A legend is a way of putting a handle on something that people are subconsciously nervous or anxious about," he explains. Witness the "Good Times" myth, which played on fears of electronic security breaches when it circulated last December. Never read an e-mail headed Good Times, the story went, because it contains a virus that will destroy everything on your hard disk. The ensuing panic was so great that even the U.S. government got into the act, posting an APB asking someone to forward a copy of the message for analysis. No one complied, says Ellis, because the virus never existed.

Nevertheless, debate raged for weeks over whether a virus could be

JUST THE FAQs

The truth about urban legends, as determined by the newsgroup *alt.folklore.urban*:

- **The size of CDs was determined by the space needed to accommodate Beethoven's 9th Symphony (True)**
- **Indiana House Bill #246 of 1897 would have decreed that π = 3.2 if the state Senate hadn't killed it (True)**
- ***The Los Angeles Times'* politically correct spelling-checker program resulted in a TV listing of *The Creature from the African-American Lagoon* (False)**
- **A 1990 column in the *Fresno Bee* substituted "in the African-American" for "in the black" (True—a journalist's prank)**
- **Apple uses a Cray to design hardware systems; Cray uses an Apple (True)**
- **B.F. Skinner's daughter died/committed suicide/sued because she was reared in a Skinner box/special crib (False)**
- **Petomane, a fin de siècle Frenchman, got rich farting as a music hall act—a fartist (True)**
- **The movie *Three Men and a Baby* has a scene with a real ghost in it (False)**
- **The crotch-seam rivet used in original Levi's jeans was dropped due to pain from standing near fires (True)**
- **Most mass-market beers contain foaming agents to make them form a head (True)**
- **Tasmanian devils are not extinct (True)**

Principal source: The* alt.folklore.urban *Frequently Asked Questions list, ©1995, Terry Chan and Peter van der Linden.

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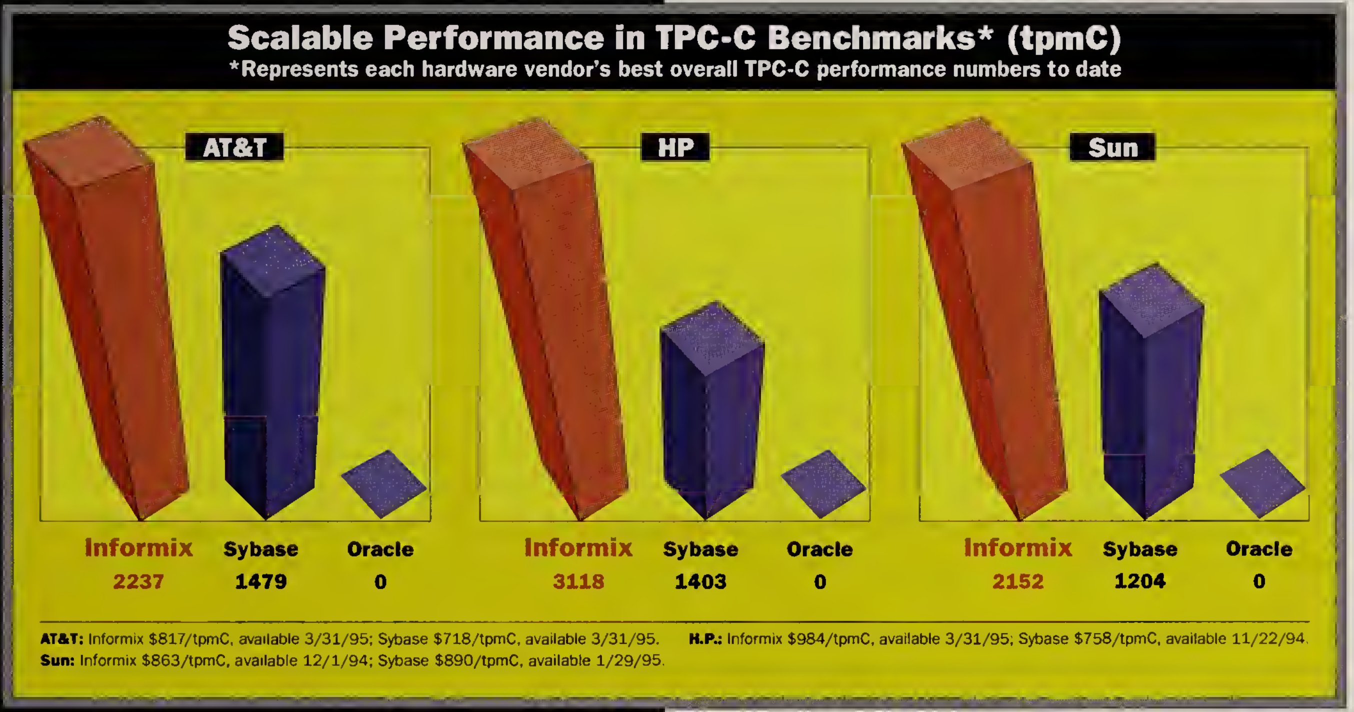

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embedded in an e-mail message. "You could almost see the hackers bristling at the challenge," Ellis recalls. As a prank, people began sending messages titled Good Times that said, "I'm destroying your hard drive now." One such hoax in the form of an e-mail chain letter instructed recipients to erase their own hard drives immediately in order to win $1 million.

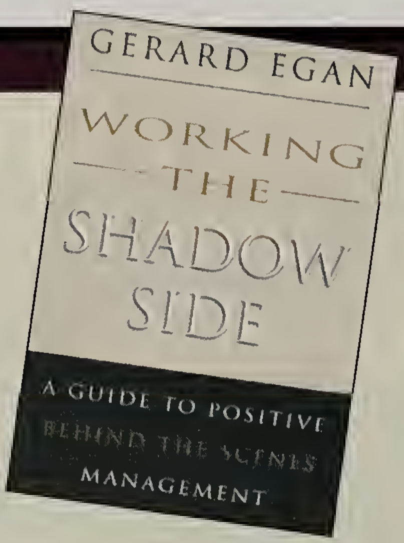
Has the Internet changed how urban legends spread? In fact, says Ellis, people have always used any available media to perpetuate them. But now the traditional validating element of a story, the "friend of a friend who told me" or "I read it in the paper," might be replaced by "I saw it on the Net." Netizens, however, are hard to convince. "Most Net-cruisers cultivate a skeptical persona when posting urban legends," Ellis says. "A statement of sincere belief in front of a wide audience would probably provoke dozens of flames."

The biggest change is that worldwide communications enabled by the Net have led to the realization that "local" legends often circulate simultaneously in many parts of the world.

If anything, the Net makes it easier to trace the spread of legends because it creates an electronic trail, Ellis maintains. Nonetheless, it may be wise to heed the warning posted on *alt.folklore.urban* in December: "If you receive a message from AOL entitled "VIRUS ALERT!" DO NOT FLASH YOUR LIGHTS AT IT! Your computer will crash! This is part of a secret initiation ritual that all AOL members have to go through. I know this is true because I read it on the Internet."

–Alice Dragoon

OFF THE SHELF



WORKING THE SHADOW SIDE

A GUIDE TO POSITIVE BEHIND-THE-SCENES MANAGEMENT

By Gerard Egan
Jossey-Bass Inc., Publishers (San Francisco), 1994
276 pages, $25

Managers are notoriously squeamish when it comes to dealing with the "softer," cultural aspects of running a business. If it can't be inventoried, amortized or depreciated, most managers don't want to be bothered. But as Gerard Egan makes crystal clear in his book *Working the Shadow Side*, such an attitude is a mistake. In fact, it's the soft issues that deserve the most attention, he argues.

Consider the following scenario. As the CIO of a midsized manufacturer, you're excited about the next board meeting. With all the honchos present, you're going to propose implementing a client/server system that will streamline marketing operations and improve sales-force productivity. Best of all, you've calculated that it will pay for itself in six months. With a return like that, even Jane, the tightfisted CFO, will support you.

The meeting turns out differently, though. Before you can say "ROI," Jane and her crony from marketing launch a coordinated attack. They question your motives, challenge your conclusions and ignore your numbers. You leave the meeting with only one item on your agenda—update your resume.

Perhaps Jane fears technology or thinks you're treading on her turf. Maybe she simply dislikes you. Whatever the case, Jane is one of those people who exhibit "shadow-side" behavior. It's these kinds of unspoken, unwritten and unmentionable activities that govern how people and organizations really operate, Egan contends.

Such cultural issues often go unrecognized or are ignored by management, to the ultimate detriment of the business. But it doesn't have to be this way, and Egan provides a useful guide for navigating through a minefield of shadow-side activity.

A professor of organization development and psychology at Loyola University of Chicago, Egan has consulted for the likes of Motorola, British Airways and Amoco. Every organization, he argues, is rife with enough in-groups, outgroups, cliques, tribes and warring factions to rival any high school. And don't forget to include ego, finger pointing, suspicion, sabotage, political infighting, arrogance and complacency into the mix. When left unchecked, these elements can have a negative impact on a company.

Shadow-side behavior can be found not just in individuals but in companies as well. Egan cites IBM as an example whose deterioration was caused by arrogance. If management had been quicker to recognize and react to the firm's "we-know-best-what-the-customer-wants" attitude, much of the current pain and suffering might have been avoided, Egan writes.

The trick is to recognize shadow-side forces at work and figure out how to harness them. Throughout *Working the Shadow Side*, Egan offers practical advice and suggests techniques for doing just that. Real-world situations are used to clearly illustrate points, and, thankfully, Egan refrains from using psychobabble and business jargon. Above all, he emphasizes that dealing with behind-the-scenes activity is a necessary and ongoing part of every manager's job.

Egan believes that intelligence and technical competency are not enough; managers also need to be wise. Reading his book may not guarantee wisdom, but it will enlighten anyone who questions the impact that culture has on a business. Sure, it's touchy-feely stuff. But from the anecdotes Egan provides, it seems a dual psychology/sociology degree may be better than an M.B.A. when it comes to preparing for a successful management career.

–Megan Santosus

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All Together Now

Sometimes if you want something done right, you just have to do it yourself. And if you also want it done on time and under budget, you might have to break the rules.

BY ANNE STUART

According to E. Hillary Buckman, MIS director at Polaris Service Inc. of Marlborough, Mass., the only way to complete her company's client/server conversion was to take the standard manual on software development and throw it out the window.

Buckman wanted to implement a software solution for shipping, receiving, purchasing, inventory, invoicing, customer service, technical support, repairs, quality control, finance and accounting. She estimates that if she had gone the traditional route with off-the-shelf software, the job would have taken up to 18 months. Working in consecutive steps, her staff would have had to install the software, transfer data, change Polaris business processes and terms to match the vendor's, and train all employees on the new product, in addition to installing a new database.

Instead, she formed a team of specialists to develop the system in-house, working simultaneously on several phases. The approach, which Buckman calls a "parallel work team," allowed Polaris to create and implement its PolarSoft enterprisewide software package in just five months, including fully converting all data, creating and running training courses, preparing a training video, installing an online help program and writing a user's manual.

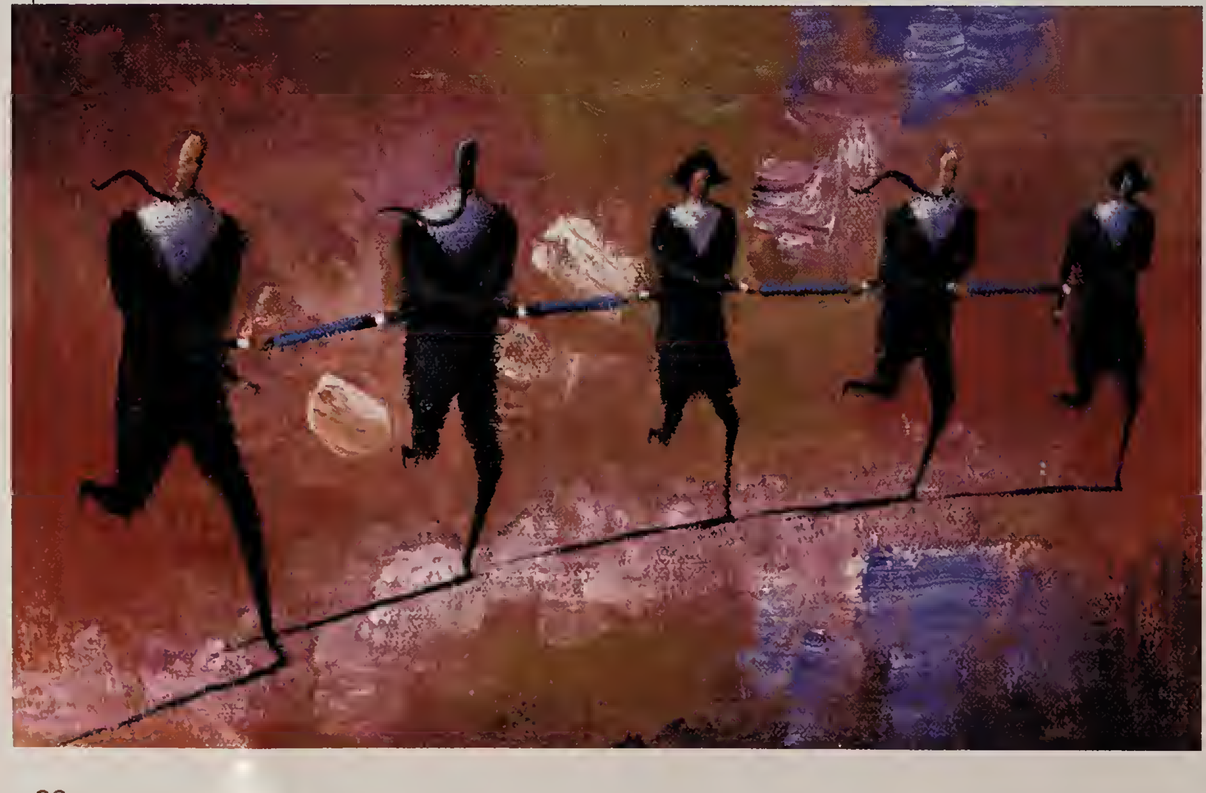

ILLUSTRATION BY PAUL ZWOLAK

But Buckman's bosses were most impressed with the project's bottom line: less than $100,000, as compared with the $300,000 estimate for the third-party solution.

Taking the tandem approach involves plenty of risk, primarily because it relies on trust, collaboration and assumptions. As Buckman puts it: "You have to assume everything is going to go right."

Founded in 1986, Polaris provides repairs, parts, support and training for Sun hardware and software, and it services other Unix manufacturers' client/server products. Since 1993, the company's payroll has quadrupled. The MIS department needed to convert the company's five legacy systems into a single client/server solution that would also support satellite offices in Fremont, Calif., and the Netherlands.

Buckman reviewed more than a dozen software packages. Each required an upfront expenditure averaging $300,000, plus $50,000 to $100,000 for a relational database and additional maintenance costs. Despite the expense, none offered the combination of features and applications Buckman felt Polaris needed.

Although reluctant to tie the company's computing future to a single vendor's vision, Buckman eventually chose a third-party software package. But she immediately realized she had made a mistake: Besides the initial outlay, projected maintenance costs were three times higher than expected. She canceled the deal.

So Buckman decided to do it her-

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self. To manage that, she had to step off the standard linear path of software development.

Normally, the process involves several sequential steps: design specification, prototype development, beta testing, importing data, documentation and training. Typically, the same team works on the whole project, finishing one stage before moving on to the next, where each person plays a different role.

Instead, Buckman created a team of six specialists—three full-time Polaris staffers and three contract employees—selected on the basis of skill sets that complemented each other without duplication. Each member handled a single specific function for the project's duration.

But the real difference was that, much of the time, team members worked in tandem rather than in sequence. For instance, one began programming as others began pulling data from legacy systems and setting up clients.

In adopting the parallel work-team approach, Buckman initially outsourced the software design. But after the vendor tripled the price and missed three delivery dates, she added that phase to the in-house parallel effort. One team member designed the software as another simultaneously prepared documentation.

Development involved not only selecting what Buckman calls "the best of breed" in available technologies but meeting individually with 70 end users to find out what applications they wanted or needed. To ease the transition, the team used terminology identical to that of the old systems and created the color-coding and icons users requested.

Team members also reengineered many of the company's business processes, incorporating the changes into the new software. For example, several shipping forms were merged into one multiple-use form. Purchasing information was consolidated in a single location, so buyers considering a particular product could easily access a list of vendors, the last price each vendor charged for the product, the average expenditure, minimum and maximum order quantities, and other information that might help speed decision making. Previously, the data, if available, was scattered through the company's system or available only on paper.

The PolarSoft project's most dramatic results were the cost and time savings. But users report plenty of other benefits as well. "Reports that took 10 to 20 hours on the old system can be done in a couple of minutes," Buckman says.

The software also improves customer service, making it easier to see which employee handled the last contact or repaired a particular part. "That changed the way the company does business," Buckman says. And the system features a new database with more than 1,000 uniquely numbered fields, accessible to any employee familiar with Microsoft Excel.

"The whole team is responsible for success and failure."

–E. Hillary Buckman

Buckman, who now promotes the parallel work-team concept both within her company and elsewhere, says its success hinges on achieving the perfect mix of personalities and skills. When making hiring decisions, the proper mind-set—highly motivated, hard-working, cooperative—may outweigh previous experience with similar hardware or software environments.

Job descriptions should be based on function, not standard project phase or past titles. "Take risks," Buckman says. "You can't be afraid to take someone who's a programmer and say, 'Work on the data.'" Selecting team members from diverse personal and professional backgrounds provides broader opportunities for innovative problem solving.

All team members must be able to work collaboratively as well as independently. "That's what teams are all about: the synthesis of ideas," Buckman says. "[At the same time], there has to be an ability to create a team personality that doesn't stifle all the individual personalities."

She suggests that leaders nurture the esprit de corps by letting members name the team, perhaps designing a logo for T-shirts or coffee mugs. Everyone should understand that rewards such as bonuses or promotions depend on the whole team's success rather than on individual achievements.

After the team sets up shop, the leader must watch closely for a few weeks to make sure the chemistry works, remaining ready to move quickly if it doesn't. If participants fail to perform or don't fit in, the leader must quickly cut the loss. As Buckman puts it: "You have to be comfortable firing people."

For that reason, the project leader must become a chameleon, able to substitute for anyone on the team. After dismissing a team member three weeks into the project, Buckman ended up doing all the documentation herself.

Although working independently, team members must meet frequently to compare notes, discuss problems and admit mistakes. "The whole team is responsible for success and failure," Buckman says.

The highly choreographed parallel approach also relies heavily on everyone meeting absolute deadlines. "They must meet the schedule," says Buckman, who instituted a "no-excuse" policy. She recommends establishing a project timetable and individual daily calendars.

From the beginning, team members must focus on the end, constantly correcting their course along the way. "If you assume that you're going to end with something that looks like the design specifications, you'll be OK," she says. "Doing everything in tandem, when you get to the end, you understand that you still have to tweak it."

And above all, she says, keep repeating this mantra: "Promise success. Then deliver." CIO

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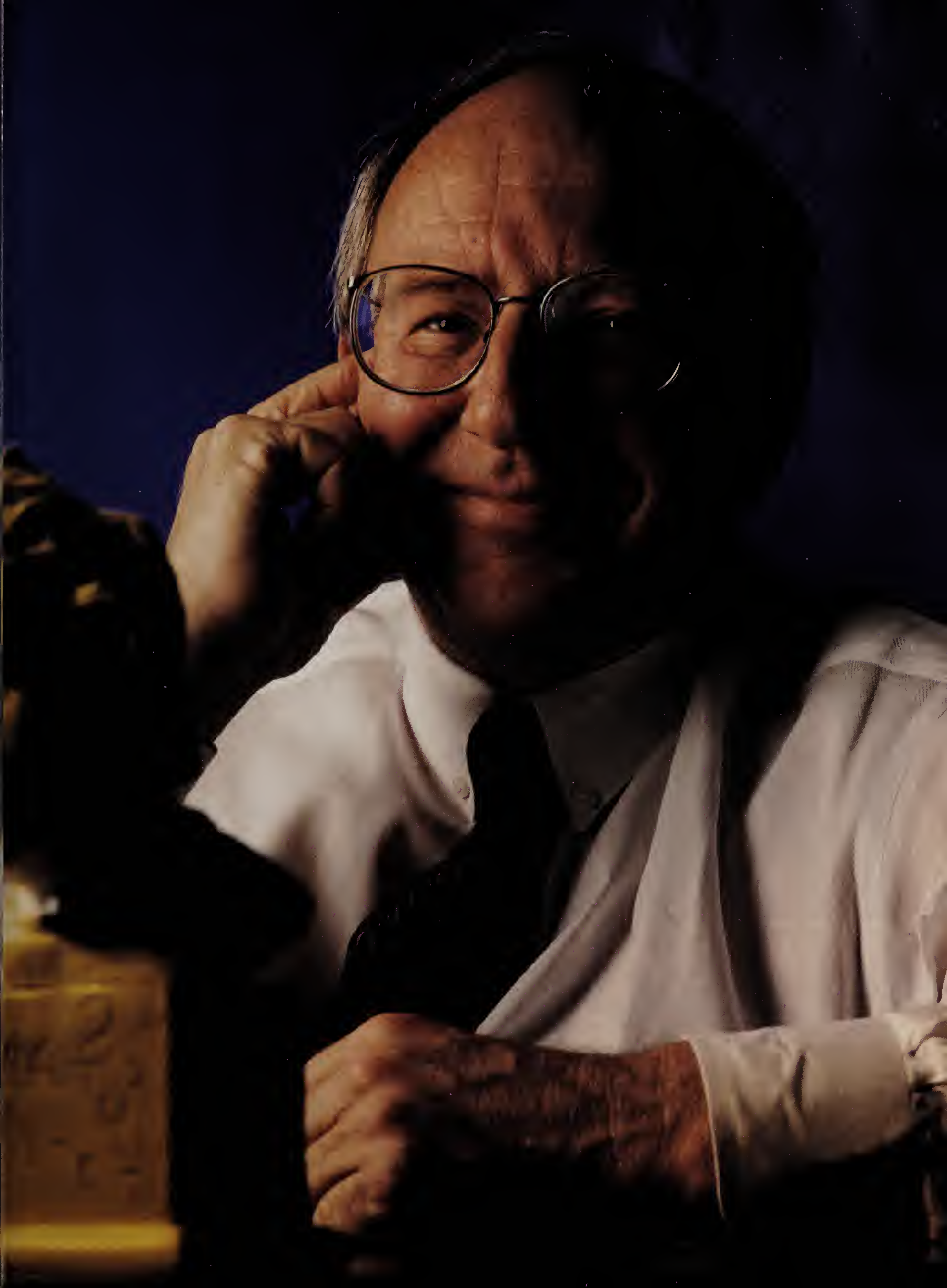
Joseph Shuster started MVE Cryogenics as many entrepreneurs do—with a concept and a little startup money. Unfortunately, his funds didn't stretch to cover the extensive research and development necessary to keep abreast of technology advances in cryogenic containers, his primary product line. "In cryogenics," he says, "the battlefield was technology, and I had no money to put into the battle." Fortunately for Shuster, he remembered that talk is cheap—in many cases, free. Instead of overstraining his company coffers, he expended intellectual capital, reaching out to talk with an entire network of academic and industry experts. Putting in brainpower instead of bucks, he says, "is a hell of a better model than the opposite way."

Even after he sold that first company, Shuster remained fascinated by what he had accomplished through sharing and gathering knowledge; he says his company never would have succeeded had he not contacted that broad range of experts. By 1984, he had conceived the idea of a

BY CAROL HILDEBRAND

PHOTOGRAPHY BY STEVE WOIT

GREAT MINDS *are at the heart of Joseph Shuster's business: putting clients in touch with the technical experts who have the information they need.*



ANDY MICHUDA: *Teltech has developed its services based on how clients gather, use, share and manage information.*

"knowledge commons," a single area where professionals could choose from a variety of media—human and nonhuman—containing technical expertise. "I knew nothing about the information industry," says Shuster, "but I knew how the technical end user thinks."

Shuster's knowledge commons has grown into Teltech Resource Network Corp., a Minneapolis-based company that specializes in providing highly technical knowledge to its 2,000 corporate and government clients. You don't have to learn any technology or even know precisely what you're looking for to get help; all you need is a telephone. Teltech's resources include a network of more than 3,000 human experts and 1,600 technical databases, and skilled "knowledge analysts" who help clients get the technical answers they are looking for. The company blends interactive human services, technical search tools and a comprehensive knowledge of human information-gathering behavior into an impressive knowledge-management environment. According to knowledge-management expert Thomas H. Davenport, other organizations would do well to emulate that.

In this era of horizontal organizations, collaborative computing and cross-functional work teams, many companies are taking a closer look at how information flows throughout the organization, where it resides and how an employee in division B would find a piece of information even if it lived across the country in the brain of a colleague in division C. The new corpo-

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> The new corporate challenge is to manage the elusive and intangible asset of organizational knowledge, making sure that raw data is transformed into business innovation through interpretation by "knowledge workers."

rate challenge is to manage the elusive and intangible asset of organizational knowledge, making sure that raw data is transformed into business innovation through interpretation by "knowledge workers." To be successful, these knowledge workers need to execute an all-new version of the corporate double play. Instead of land, labor and capital as the major players, however, today's Tinker-to-Evers-to-Chance all-star infield is data to information to knowledge.

According to business guru Peter Drucker, a successful knowledge triple play depends not only on good internal knowledge-management policies, but also on savvy use of outside information experts (such as Teltech) to enhance team performance by locating external informational sources. Writing in the January/February 1995 *Harvard Business Review*, Drucker says, "Even big companies, in large part, will have to hire outsiders to help them. To think through what the business needs requires somebody who knows and understands the highly specialized information field. There is far too much information for any but specialists to find their way around. The sources are totally diverse."

A study by Thomas Allen, senior associate dean and professor of management at the Alfred P. Sloan School of Management at MIT, corroborates Drucker's ideas. He found that top-performing teams in companies were 20 times more likely to reach outside the organization to other disciplines for knowledge and information than their lower-performing counterparts.

Many companies try to nudge performance up through technology, using workgroup software to spur internal information flow and research tools such as Dialog or the Internet to keep abreast of outside events. But technology alone is at most only half a solution. Companies intent on using information to its highest possible function must also address human behavioral issues around the area of information gathering and sharing.

Consider, for example, this hypothetical situation: You've got an earnest young engineer working on a new engine design at Huge Aircraft Co. He's struggling with a plating problem for one of the components, and he needs to resolve the issue before he can move on. Here are his problem-solving options: He could send a software agent out onto the Internet to search out some of the issues for him, although it's hard to make software understand what he wants. Or he could truck across the building to the corporate library and wrestle with myriad different database interfaces. Or he could randomly call around and see if anybody else in his company has already solved this problem. Or he could yell over the top of the cube to his neigh-

Learning to Know

The skills required of a Teltech knowledge analyst are many and diverse. To keep its level of service uniformly high, the company invests heavily in an environment of continuous learning.

Since nothing at Teltech seems to be singly human or machine, it isn't surprising that its knowledge analysts must be comfortable with both sides of the equation. Although most come from a technical background such as engineering or chemistry, they must also work well with people, says Dean Dubbe, director of operations. "Our analysts usually come from a certain personality type," he says. "[They must] demonstrate a willingness to help others—what I call the human element."

Knowledge Analyst David Solend agrees. When a team of analysts interviews prospective hires, he says, communication skills are the first thing they look for, since an analyst's primary job is to help clients articulate informational needs. "Sometimes getting out of them what they really want is half the process," Solend says.

Dubbe fosters a continual learning environment, since the more analysts know, the better they can direct the clientele. Knowledge analysts have mentors for their first year of service; the mentor acts as an informal knowledge navigator, guiding analysts to pockets of expertise within the company. New hires also attend classes in customer service, interviewing and database research for two or three months before they ever take a phone call. All analysts attend weekly sessions in which one will expound on his or her particular area of specialization. The learning process, Dubbe says, almost drives itself. "It's a peer thing. People want to demonstrate their capabilities because, as they move up the learning curve, they'll be able to help others answer questions." *–C. Hildebrand*

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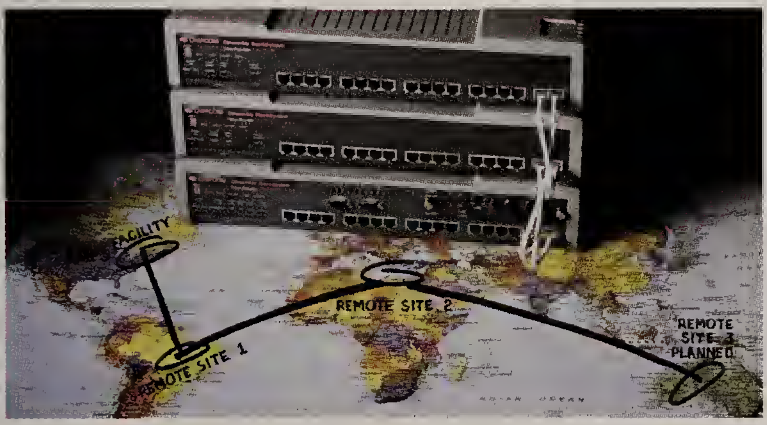

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bor Joe and ask his opinion. Which solution do you think he'll choose?

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Such disinclination to search very far afield for information is not atypical, says Andy Michuda, vice president of marketing for Teltech. Citing a study on information-gathering behaviors from MIT's Sloan School of Management, Michuda says, “If you have to walk more than 40 feet for a piece of information, the likelihood of going after that piece of information is remote.” While it may be unusual for a company to study behavioral change in its clients, Michuda says it's common sense. “If we don't have engineers use our service, we don't have a business. That's how we got into studying this.”

> “If you have to walk more than 40 feet for a piece of information, the likelihood of going after that piece of information is remote.”
>
> *–Andy Michuda*

This is one area where Teltech has differentiated itself from many research and information-access companies, says Davenport, a research fellow at Ernst & Young's Center for Information Technology and Strategy in Boston and the head of the University of Texas's Information Systems Management program. By examining how its clients gather, use, share and manage information, he says, Teltech can better structure its offerings into a form that technical people feel comfortable with.

For example, the 40-foot rule. Teltech's services are available by phone, fax, computer dial-up or the Internet—in other words, as close to the desktop as possible, and certainly within the 40-foot infozone.

The company also cultivates the gatekeepers of external knowledge at client companies, such as corporate librarians and senior research executives, who can actively influence information behavior in their constituents. One such gatekeeper is Nancy Lemon, the research-library supervisor at Owens-Corning in Granville, Ohio. Her company has

Guide Posts

Teltech offers five basic services

The **Expert Network** database, to which both clients and knowledge analysts have access, tracks more than 3,000 consultants, academics and recent industry retirees with in-depth technical knowledge. If a customer needs an expert in a particular rarefied niche, Teltech analysts also have access to a database of 6,000 more-esoteric experts.

Clients first talk to a Teltech knowledge analyst, who can guide them to experts on subjects ranging from thermal blankets for jet engines to embrittlement of metals. The experts receive a fee from Teltech for each client consultation and pledge to keep any information thus gleaned about the client confidential.

For **Assisted Database Searches,** a client contacts a knowledge analyst to search through the more than 1,600 technical and scientific databases to which Teltech subscribes. Using proprietary Teltech software, the analyst can “take over” the client's PC screen to show the process of each database search. Since both client and analyst are looking at the same screen while simultaneously discussing the results on the phone, the analyst can guide the client into clearly articulating specific knowledge needs. Once useful information has been dug up, the client can save or print search results.

A **Vendor Service** was initiated in response to frequent calls from clients looking for companies providing a particular product or service. A customer describes the product he or she is looking for to a knowledge analyst, who then combines Teltech's database-search powers with its expert network to locate several likely vendors. The analyst then calls each vendor to discuss product availability and prices, and passes on the results to the client.

The **Knowledge Management Service,** Teltech's newest effort, is a consulting group that helps companies compare their current information-management process with their ultimate goal and plots a road map on how to get from one spot to the other. For example, a large oil company wanted to know how to get its remote sites to use the corporation's internal research service. Bill Dietrick, a knowledge strategist at Teltech, assessed 12 sites' attitudes toward the service based on 18 or so characteristics that affect a group's willingness to change. He then created a behavioral map to help the research service target each site's specific needs.

Lastly, the **Technical Alert Service** is similar to the weekly customized newsletters offered by other information providers. The alerts are briefings sent electronically on significant technical-research developments in a variety of fields, such as biotechnology or coatings. Since technical-alert analysts contact researchers directly, in some cases Teltech clients can hear of new advances well before the press does.

–C. Hildebrand

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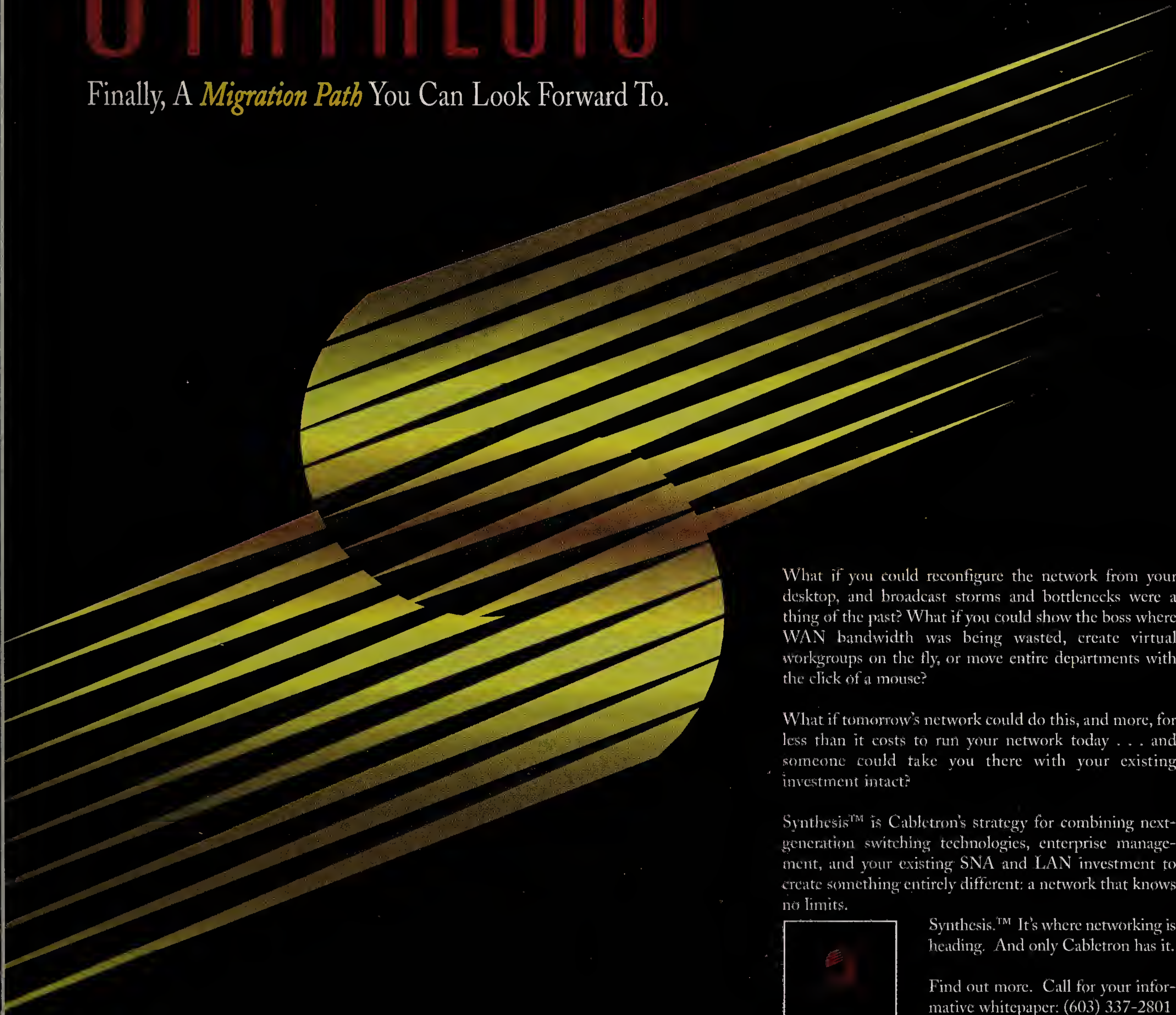

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been using Teltech's services for about five years at the behest of the senior vice president of science and technology (R&D). While the library remains Owens-Corning's biggest Teltech customer, particularly for locating prospective product vendors, Lemon says she actively encourages research and manufacturing personnel to contact Teltech directly.

"It's a productivity tool," she says. "[Teltech] will go off and do your search, and you don't have to spend time playing the information search game; you can go on with core company work. It certainly reduces cycle time." Since the average knowledge worker spends as much as one-third of her time looking for information to inform her decisions, Michuda points out, cutting down on this expenditure can result in significant productivity boosts.

Focusing on information-seeking behavior is just one of the underpinnings of Teltech's information-management strategy, however. According to Davenport, Teltech's hybrid people-technology environment is the most balanced approach to knowledge management. The company recognizes that much knowledge lives in synapses rather than in bits and bytes; therefore, it directs clients to people with expertise as well as to online information, and it uses people rather than machines to act as guides in defining, clarifying and interpreting database-search results. "Such tasks are unlikely to be the province of machines in our lifetime," says Davenport.

PAUL FRASER *helped build and now maintains Teltech's online search and retrieval system.*

One important element of Teltech's knowledge-management environment, however, *is* the province of a machine. KnowledgeScope, Teltech's online search and retrieval system, is the primary structure for categorizing and searching for information for Teltech's customers. (As many consultants point out, knowledge must have a structure in order to be leveraged within a company.)

The key entry point to the 'Scope is a thesaurus of more than 30,000 technical terms and concepts. In 1992, Teltech spent about 10 months reengineering this database from a hierarchical, tree-shaped structure to its current thesaurus shape, says Paul Fraser, one of the knowledge engineers who built and maintains the 'Scope.

The old structure was both difficult to navigate and too rigidly constructed for the fluid nature of information, he says. For example, although some bits of information belonged in more than one spot, the old structure would not allow multiple placements. With a thesaurus, the terms are linked through synonym cross-referencing, and the online expert database is also tied in.

Now, says Fraser, not only is the 'Scope easier to use, but it is a source of knowledge for the entire company, from the analysts to the sales force. Fraser's group adds between 500 and 1,200 new terms monthly (many of which are supplied by the analysts and salespeople) and uses them as a springboard for recruiting new experts. The 'Scope is a constantly evolving organism, he says, and the members of his group, rather than being purely database keepers, have grown into a much more strategic role as information shapers.

Attitudes like Fraser's, in which technology is marshaled into the service of information rather than the converse, have helped Teltech evolve into an organization that Davenport calls "a bellwether of new practices in information and knowledge management." In fact, Teltech fashioned its consulting division, which helps companies design knowledge-management environments, from its own lessons in working with knowledge (see related story, Page 38). Not many companies have the chance to apply their own product internally; by practicing what it preaches, Teltech is its own best advertisement. CIO

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JOSEPH DE FEO *believes Barclays is well-positioned to lead the revolution in banking and financial services promised by new electronic delivery channels.*

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The Changing *of the* Guard

Britain's largest bank is steeped in tradition. But the Barclays Group recognized the need to embrace change—and IT—to prepare for a fully wired future.

BY ELIZABETH HEICHLER

PICTURE A 300-YEAR-OLD BRITISH bank, long situated in the old Royal Mint next to the Tower of London. Images of dark, polished wood furniture, brass fixtures and a hushed atmosphere probably come to mind. Now imagine what the bank's use of IT would be like. Technological innovation is not exactly what you'd expect, right? Well, think again. As deregulation, IT advances and new methods of delivering services combine to change the face of Britain's financial-services industry, one if its oldest players is banking on its IT resources to pull ahead. Indeed, the London-based Barclays Group, the United Kingdom's largest bank valued at around £10 billion (approximately $16 billion), has become something of a pioneer in the industry.

It wasn't always so. The venerable institution has undergone a complete overhaul of its technology strategy and organization, directed over the past three years by American import Joseph De Feo. Barclays Group Chairman Andrew Buxton, a technophile who recognized that the bank wasn't taking full advantage of IT, hired De Feo as director of group operations and technology in 1989, charging him to align Barclays' IT organization with its business goals. The result has been the transformation of a reactive, centralized IT function that had a reputation for failed projects, overspending, delays, lack of focus and lack of a technology strategy into a widely devolved IT function, owned by business managers who are given some leeway in implementing the technology strategy set by top management.

To put De Feo's challenge in context, Barclays had suffered more than most during the U.K. recession that began in the late 1980s, making it among the most risk-averse of British retail banks, according to Simon Samuels, banking analyst at brokerage firm Smith Newcourt in London. In particular, Barclays (which dominates the U.K.

PHOTOGRAPH BY PETER JORDAN / LIAISON INTERNATIONAL

Visa network, according to Chris Ellerton, bank analyst at London brokerage firm S.G. Warburg Securities) was hard hit by an escalation in fraud. To minimize credit-division losses, Barclays pioneered the use of artificial-intelligence technologies in the credit-authorization process within its Barclaycard credit-card business. Faced with low marks in customer-satisfaction surveys in its retail banking business, Barclays again turned to IT for a solution; experiments with image processing to improve check clearing are now underway, according to Ellerton. In addition, deregulation of the U.K. banking market in the 1980s changed the competitive landscape by allowing banks to sell a wider variety of products. It became clear to Barclays that successful exploitation of these new business opportunities would depend on wise application of IT.

> "Any competitor anywhere can deliver a product into your market. This is changing the nature of business and competition, and you begin to wonder, what is a bank all about in this environment?"
>
> –JOSEPH DE FEO

The Barclays name reeks of tradition, and it is easy to imagine that when the no-nonsense De Feo joined six years ago, he brought in a breath of fresh air that might have initially been a little too bracing for some.

But now De Feo, who plans to invest about £1.5 billion (approximately $2.4 billion) on strategic IT applications in the next six years, believes his organization is well-positioned to lead the revolution in banking and financial services promised by multimedia and the emerging information superhighway.

"When people began to talk about the global nature of business, at first it meant the extent of world trade, but now it's about the availability of information, services and markets via electronic distribution," says De Feo. "Any competitor anywhere can deliver a product into your market. This is changing the nature of business and competition, and you begin to wonder, what is a bank all about in this environment? Where do we fit in the value chain to the customer?"

De Feo believes that advanced information services such as interactive television and smart telephones may be available sooner in the United Kingdom than in the United States because of a more hospitable regulatory environment; unlike their American counterparts, U.K. cable-TV operators are not restricted from offering voice and multimedia. "Most pilots in the U.S. are more advanced, but for many, rollout will be more difficult because of constraints on the cable and telephone companies. There are no such constraints here," says De Feo.

As new electronic-delivery channels redefine the financial-services marketplace, De Feo foresees that new classes of competitors will be able to enter the market at short notice, providing wired services to customers who were previously "owned" by established players such as Barclays. Thus, Barclays has little choice but to seize upon the same opportunity, he contends.

In De Feo's judgment, Barclays has roughly five years to get ready for widespread availability of multimedia networks. The IT group will use the time to work on a number of technology projects stemming from his belief that access to and dissemination of information over the information highway will need to be a core competence of any service-based industry.

But several multimedia projects already underway also have an immediate business driver. According to Paul Bold, manager for Barclays Multimedia, Barclays needs to find a better way to sell financial services. "The bank has a number of very complicated products, which change frequently. It's difficult for us to communicate to customers what we've got," Bold explains. "So, we've got to find new methods of communication and new delivery channels."

With the success of automated teller machines, fewer customers visit branches where information on financial-services products is available, meaning that the bank risks losing touch with its customers. And information mailed with monthly statements is often thrown away immediately, Bold says.

To address the problem, Barclays teamed up with Italian computer and kiosk manufacturer Olivetti S.p.A., a British automobile retailer, a British furniture chain and an Italian bank to develop a prototype multimedia-based kiosk service. Called Project OASIS (Online Automated Shopping and Information System), the PC-based system being built by Olivetti will allow customers to browse through sales information, enter orders and request information on relevant financial services such as loans. A pilot program will deploy kiosks in selected branches later this year.

Another venture, Project Homestead, uses interactive CD technology to provide home shopping and home banking. The service features personal financial planning from Barclays Financial Services, as well as products from a mail-order catalog firm and a travel company. In the pilot project launched in the first half of 1994, 320 customers have been provided with Philips CD-i (CD interactive) players at home and receive CDs with information about the range of products; Bold calls the results so far "very positive." However, he knows that the proof of the pudding will be in the eating. "Lots of people have spoken about multimedia, but there are very few pilots," he says. "We must find out if customers will use multimedia to buy products—then we can decide if it's a success or not."

It remains to be seen whether Barclays will be able to claim a leadership position with these customer-focused technologies once multimedia networks become ubiquitous. But in the back offices of Barclays, the group is already leading the industry in the application of artificial intelligence (AI)—and getting impressive bottom-line results.

Faced with an alarming escalation in credit-card fraud, Barclays decided to attack the problem with an AI application. The Fraud 2000 system pioneered by the bank's Barclaycard Visa and Mastercard operation is the first of its kind in the world, Barclays maintains. "Our philosophy had been to trace fraud after it was committed, and we decided to change to a preventative philosophy," says Barry Fergus, director of fraud strategy at Barclaycard.

Fraud 2000 checks customer transactions in real-time to make sure that they are in line with cardholders' previous usage patterns. Speed is of the essence, which is why the

Different Accents

Americans and Brits speak the same language, but cultural differences surface in the business arena

TONY STONE IMAGES / JOE CORNISH

While it may be tempting to assume that having a language in common means doing business in England is just like doing business in the United States, making that assumption can be a mistake—although the two countries certainly have more in common with each other than they do with, say, Italy or France.

"The structure of business in Europe requires people to think things through before they act," says Joseph De Feo, an American who is director of group operations and technology at the Barclays Group in London. "Some say that's bureaucracy or tradition, but in some cases it is worth it to think things through, to map out a vision. We spent a year thinking about the appropriate technology architecture for the group."

Overall, though, De Feo's experience conducting business in the United Kingdom has led him to believe that England is much more like the United States than it is like France and Germany. In those countries, government still runs substantial industries, and Germany in particular has organizations similar to the Japanese keiretsu, he says.

The most significant difference De Feo has found between the U.S. and Europe as a whole has been the approach to problems encountered in the course of doing business. "Americans always think they can do something about a problem, but Europeans think some things simply can't be fixed or resolved. That's the biggest problem I face."

–E. Heichler

PAUL BOLD: *The need to find a better way to sell financial services is behind Barclays' multimedia initiatives.*

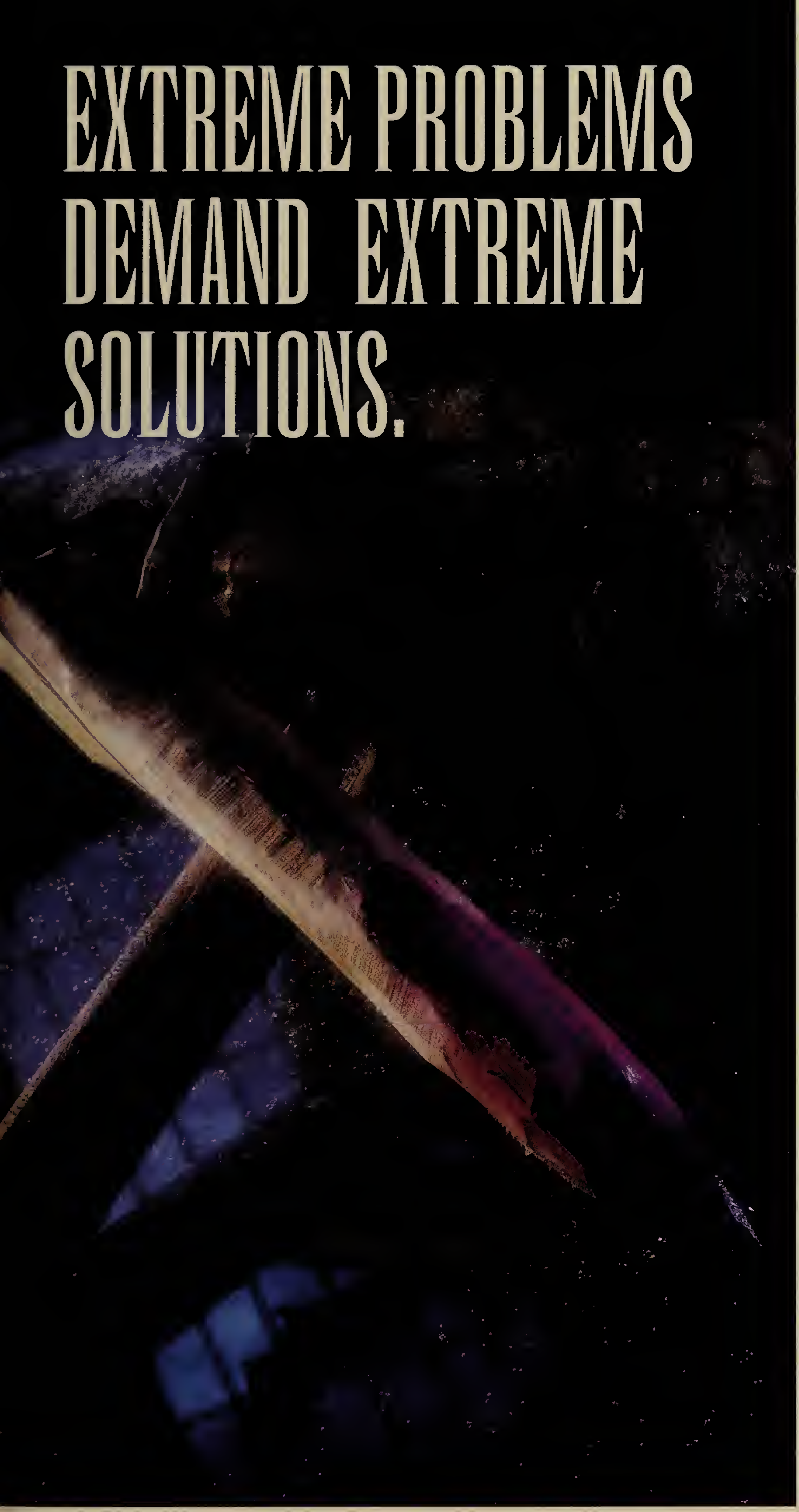
system was designed to use an expert system rather than a neural network, Fergus explains. Although specified to complete transactions in .8 seconds, in reality it completes transactions on average in .25 seconds. Software filters catch roughly 100,000 questionable transactions from the 1 million processed by Barclaycard every day. These are sent to the expert system, which, based on predetermined rules, deems an average of 200 transactions suspicious. The system refers those for further checking, issuing a "please call" rather than an authorization to the point of sale; ultimately, about 20 to 25 are determined to be fraudulent, he says. The £1.5 million (roughly $2.4 million) investment in developing Fraud 2000 is now estimated to have saved Barclaycard £1.5 million per year in the two years it has been operating.

Fergus notes that while many banks around the world have projects using similar technology, Barclays is "the only bank doing it in real-time." And while he is willing to talk about the theory behind it, the system offers such a competitive advantage that the bank will not divulge much detail about the practice, and never discusses the rules that go into the knowledge base.

Barclaycard plans to roll out a brand-new application of AI to complement Fraud 2000. As a final check, this add-on system will review credit-card transactions that have just been declined—an inconvenience for both merchant and cardholder. It will determine in real-time whether, based on the cardholder's history, a transaction can in fact be safely authorized. The hoped-for result will be happier customers without higher losses.

The two AI undertakings represent a double triumph for the Barclays Group's IT organization. Both groundbreaking projects give the bank a competitive advantage—and both were developed internally by Barclaycard's own systems-development team. Under De Feo's new IT model, the systems-development function at Barclaycard is now directed by its business managers but feeds into the overall Barclays Group IT-planning process.

PHOTOGRAPH BY PETER JORDAN / LIAISON INTERNATIONAL



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> "After all the criticism launched by the business people on IT, when we got serious about devolving responsibility, everyone got frightened and started backpedaling like mad. People were uncomfortable with the idea that they might be held accountable."
>
> –JOSEPH DE FEO

"There are criteria, well-defined platforms and architectures" set by the groupwide IT committee, explains Fergus. The Barclaycard systems-development group complies with the corporate requirements whenever possible. But when competitive pressures have necessitated moving outside corporate standards temporarily—with the understanding that the group will migrate to compliance as soon as possible—it hasn't had difficulty getting permission to do so.

"You have to have criteria you're working to, but you have to have commercial common sense, and the ability to respond to business pressures," Fergus says.

Like other lines of business in the Barclays Group, Barclaycard is now free to choose any computer service supplier. But it has opted to use Barclays Computer Operations, an IT outsourcing firm spun off from the group's old central IT function as part of De Feo's restructuring plan.

De Feo forced the IT group into the marketplace in order to create a commercial mind-set in its management. "I wanted to put them in a position where they had to hone skills to compete both externally and internally for business," he explains. "And I wanted them to develop new skill sets and learn about new technologies that they would only know about if they were in the market."

The results have been impressive. From 1990 to 1994, end-user charges for computing services dropped more than 31 percent despite a 186 percent increase in the volume of service provided to the Barclays Group. "So the productivity increases are incredible," De Feo says.

Under the current IT-management model, each business line takes responsibility for business planning, analysis and IT development for its own customer base and product set, while the responsibility for the infrastructure of the group is retained centrally by the groupwide IT committee, to ensure that there is a minimum set of standards, policies and capabilities, De Feo explains. Policies are formed and debated by the group IT executive committee, which includes IT executives from each business line. Final sign-off on corporate standards and policies comes from a separate IT board, which is chaired by Buxton.

There are problems, De Feo admits. "Business people want to do their own thing, and they fight," he says.

But the greatest challenge in executing the restructuring was getting business managers to take responsibility for their own use of IT. "After all the criticism launched by the business people on IT, when we got serious about devolving responsibility, everyone got frightened and started backpedaling like mad," De Feo says. "People were uncomfortable with the idea that they might be held accountable."

And in the opinion of De Feo—who says, "I don't like to be called an IT guy; I think of myself as a businessman"—it's not acceptable for business managers not to know about IT.

"I don't believe in the position of CIO," he adds. "I believe in business people with IT responsibilities." CIO

Elizabeth Heichler is a former European correspondent for IDG News Service. IDG News Service Correspondent Michael Parsons contributed to this report.

Barclays Group Information Technology Resources

IT Staff: 3,000 groupwide

IT Budget: £1.5 billion ($2.4 billion) for major new projects to the year 2000

Users: Over 60,000 served in 70 countries

Computer Services Group: 11 IBM Corp. mainframe computers, 77 Tandem mainframes, 18 Digital Equipment Corp. midrange systems, 31 high-volume laser printers

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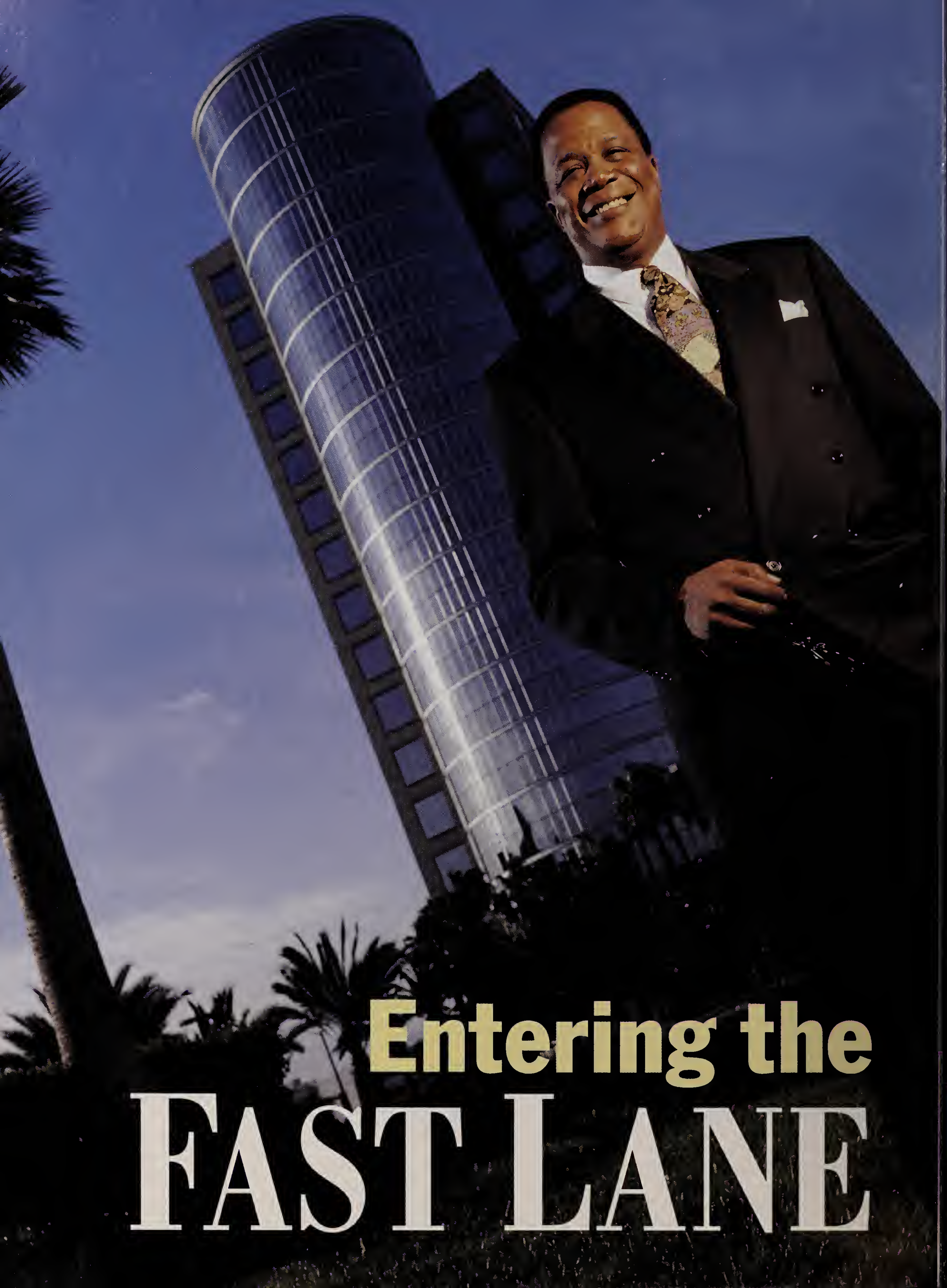

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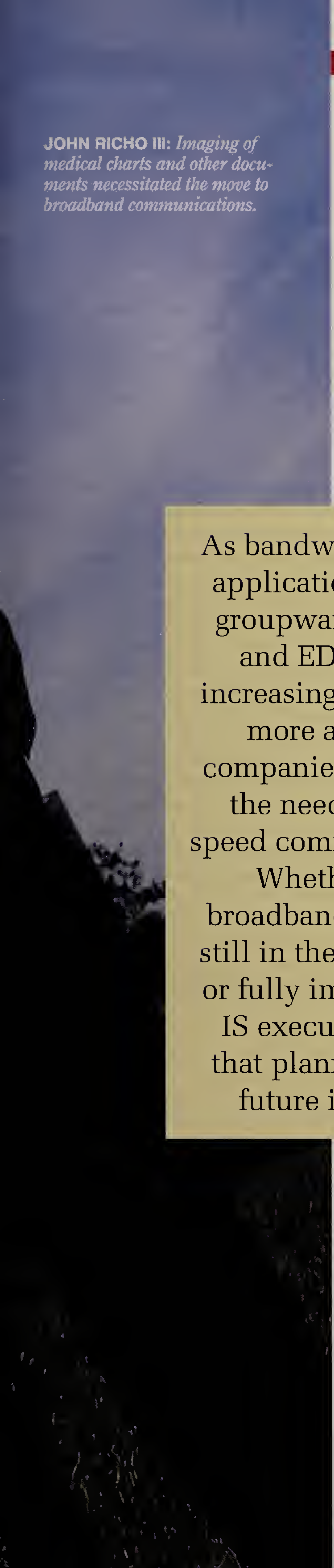


JOHN RICHO III: *Imaging of medical charts and other documents necessitated the move to broadband communications.*

Watch out, say the technology pessimists. There's a minefield out there, and its name is broadband network technology. Yet another set of buzzwords, acronyms and technical standards to learn. One misstep and you're history.

Don't you believe it. You have time, most experts say. There are decisions you can make now and still leave the door open to options not yet in our field of view. Yes, there are buzzwords, acronyms and technical standards involved, but you can write them all on a single note card, and by the time you need to apply them to your decisions, their meanings will be firmly fixed in your mind.

Many companies are under pressure to upgrade their network infrastructures in order to accommodate demands for higher bandwidth brought about by new ways of doing business, says Tom Nolle, president of CIMI Corp., a telecommunications consultancy in Voorhees, N.J. Software applications such as electronic data interchange (EDI), imaging and groupware create huge files. The need to ship these files from one place to another creates the demand for high-speed communications, or high bandwidth, in the parlance of networking experts. Bandwidth in this context refers to the capacity to move information. (By contrast, in broadcast terminology, bandwidth refers to the range of frequencies a communications device can handle.)

Some corporations, particularly in industries such as financial services and health care, have already increased their information-transfer capacity to meet current and near-future needs. For example, Charles Schwab and Co. has installed a broadband network to handle more than 4,000 investor calls each day (see related story, Page 55). California Psychiatric Management Services (CPMS) upgraded its network in order to make digitized images of patient records available to those who need to see them (see story, Page 54). But for most corporations, today's requirement is to get ready for tomorrow's needs. It's time to think, plan and learn about technological options; the actual upgrading can wait.

As bandwidth-hungry applications such as groupware, imaging and EDI become increasingly common, more and more companies are feeling the need for high-speed communications. Whether their broadband efforts are still in the early stages or fully implemented, IS executives agree that planning for the future is critical.

BY MICKEY WILLIAMSON

PHOTO BY BRIAN LENG

Specifically, you can make sure you know where your company is going—and how you can help it get there. "[IT] people make mistakes when they don't really understand what the business wants to do, not only the business today, but where the business plans to go in the future. You have to map your plans to those plans," says Derek Archer, senior architect at Charles Schwab's corporate headquarters in San Francisco.

California Psychiatric Management Services

Los Angeles

California Psychiatric Management Services (CPMS) provides short-term care to patients who suffer from serious mental disorders. "Imaging was the impetus for our move to broadband," says John Richo III, executive vice president for MIS. "We have to move volumes of medical charts to various locations throughout the state in real-time. In addition, utilization-review nurses need online access throughout the day to review charts."

A patient's chart averages 90 pages, Richo explains. Once every 24 hours, a utilization nurse reviews each chart to be sure that the patient is receiving proper care. The imaging application allows the nurse to move among pages that refer to each other, rather than having to turn pages that are arranged in reverse chronological order.

Another imaging application handles billing the state's MediCal system. Each bill must be accompanied by the patient's chart. MediCal approves the patient's admission and determines length of the stay. Submitting bills promptly is important. "It can cost anywhere from $800 to $2,000 a day for a patient," Richo says. "If a patient is admitted for 14 days and MediCal denies payment for 10 of those days, that's a lot of money."

Richo chose SMDS (switched multimegabit data service) for its speed and availability. "We could have scanned documents during the day and batch-processed them overnight, with the charts available at corporate headquarters the next morning, but I wanted everything to operate in real-time. I was looking for the broadest bandwidth available a year and a half ago. There are other technologies that are hot today, but they weren't available at the time."

Gary Kessler, senior member, technical staff, with Hill Associates in Colchester, Vt., suggests looking at the locations to be connected and whether information is stored centrally or distributed throughout the company. "As the CIO of a large company, I [would] need to ask myself which branch offices I plan on connecting and how I want them to be connected. If it's a purely SNA shop [based on IBM's Systems Network Architecture standard], then I'm probably going to have all of the communications brought back to some central site. If it's a distributed environment, then I want the broadband service for LAN interconnection. The type of connectivity and the number of sites I have to connect will determine which solutions I will consider."

The CIO should also consider the motives behind the planned network upgrade, says Kessler. "Are you talking about a complete reengineering of the way your company does business? Or are you planning to do business in the same old way but just faster? The answer may well dictate the way you reengineer your telecommunications network."

Selecting telecom technology means sifting through a modest number of options for information transport and access. Transport technologies are the roadways along which the information moves. Access technologies are the vehicles in which the information is carried along the roadway to its ultimate users. "We use the term transport infrastructure to mean that part of the network whose goal is to carry traffic rather than to connect users," Nolle says. "A lot of people use the term backbone for the same purpose."

Most of the telecom vocabulary you need to know refers to transport or access standards, which a variety of vendors implement in their products. Some standards, and hence some products, are compatible with each other but not with other standards. That's where the problems arise.

Most large corporations today operate T1 networks, which transport data at the rate of 1,544,000 bits of data per second (usually written as 1.544Mbps), the equivalent of 24 voice channels, so it is easiest to use T1 speed as the frame of reference for comparing other transport technologies. Although definitions in the high-speed telecommunications area, as in any young technology, are relatively imprecise, most experts agree that broadband communication is anything faster than T1. T1 channels can be combined, or multiplexed, to create higher-speed capacity. For example, a T3 network consists of an equivalent 28 T1s, yielding speeds of 45 (actually 44.736) Mbps. Between T1 and T3 is fractional T3, in which a company has purchased transmission capacity in some multiple of T1 speeds (written as NxT1, where N is the number of linked T1 channels), but less than T3's 28 T1s.

ILLUSTRATIONS BY JEAN TUTTLE

SONET (synchronous optical network) is another standard, designed for multiplexing and transmission of broadband information on fiber-optic networks. Depending upon how it is configured, SONET can operate at speeds from 51.84Mbps to 622Mbps and beyond.

Then there is the question of how information will be packaged to ride on the network. Foremost among today's choices are frame relay, which packs data in formatted variable-length information packets, and SMDS (switched multimegabit data service), which sends data in fixed-length packets known as cells. Each has its advantages, drawbacks and uses, experts say.

For example, Kessler explains, "frame relay is best suited for applications where most of the traffic is going back to some central site, where most of the communication takes place within an organization, and where there is some predictability about who you will be communicating with." Because of its variable-length packets of information, frame relay is not well-suited to sending digitized voice or video, experts agree, since this type of data depends upon an uninterrupted flow for realistic reception. Adds Glenn Long, senior consultant for network-design engineering at Westinghouse Communications in Pittsburgh, "If you want to send a spreadsheet to somebody, or you're doing some interaction with a database, that's what I call 'bursty' traffic. It's a blip for a short period of time, and it's very well-suited to frame relay."

SMDS, on the other hand, is usually a bet-

DEREK ARCHER:
"We knew that we had to improve the system."

PHOTO BY KATHERINE LAMBERT

Charles Schwab and Co.

San Francisco

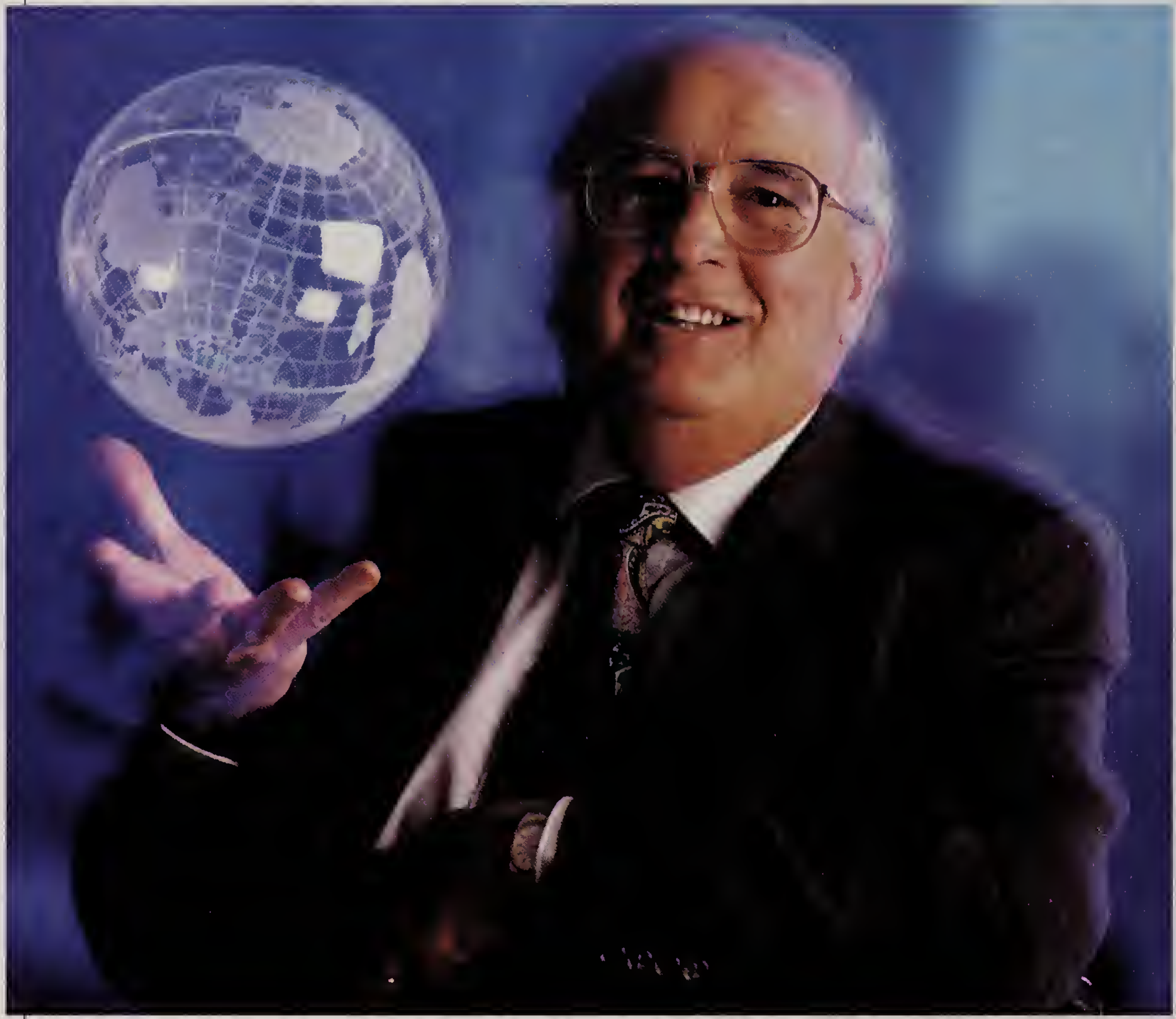
The phones can really ring off the hook at the Charles Schwab discount brokerage. A voice-driven automated trading system handles more than 14 million calls a year, while another 4,000 voice calls per day come into Schwab's seven major call centers, each one staffed with some 500 people. Add to that another 250 branch offices, each with between two and 40 staffers, and you have a requirement for enormous voice-carrying capacity.

"Sometimes we'd lose a call, and this frustrated the customer, who would either dial back in or go somewhere else. We had no way to measure what percentage of calls we were losing, but we knew that we had to improve the system," says Derek Archer, senior architect for the firm.

In early 1994, the Schwab IT organization completed an 18-month project that installed T3 lines linking the seven call centers around the United States. Now the company is moving toward SONET for added capacity. Meanwhile, it is changing its business model, moving into mutual funds and pension accounts in addition to conventional stock trading.

"Technology is just another tool," Archer says. "It's our goal to understand what the business does and not just react, but be proactive. If the business needs an application, nobody cares if it presents an integration problem. That's my problem."

Eventually, Archer predicts, ATM will handle some of the data traffic, but he doesn't see voice capabilities coming to maturity for a long time. By then, he says, voice will be just another form of digital data, "but it's not going to be in the next year or so."



AL MARTINO: *After a feasibility study, Stone & Webster Engineering decided that broadband could wait.*

PHOTO BY GEORGE SIMIAN

ter choice where information is distributed rather than centralized, or where demand runs in cycles. "If I'm in a company that exchanges data with many different companies or corporate sites, SMDS is potentially more attractive," says Kessler. Its fixed-length cells can also handle voice and video.

Experts often use telephone and mail-delivery service analogies to explain part of the difference between frame relay and SMDS. Frame relay is like a telephone system, they say, where the user dials a phone number and, in doing so, tells the network when and where to call. Frame-relay packet destinations are identified by the route along which they will travel the network. By contrast, SMDS is more like sending a letter by mail or courier. The user specifies the recipient's address, and the network decides when the data will be delivered and by what route it will travel.

That's today's fast-packet access technology, but there is more to come. Experts agree that everyone is heading toward ATM, or asynchronous transfer mode, with transmission speeds of 155Mbps. ATM products encompass both the access and transport portions of the technology. "People almost feel that there is some sort of societal mandate for them to consume ATM and that they are going to be culturally disadvantaged if they don't," says Nolle. This cell-based means of transporting all kinds of data will ultimately handle frames and cells from desktop to destination, but many observers say it is not yet sufficiently mature (see "A Switch in Time," *CIO*, Oct. 1, 1994).

Carroll Lairamore, manager of telecommunications integration at Oklahoma Gas and Electric, in Oklahoma City, takes a wait-and-see attitude toward ATM. "It's probably a bit more solid than vaporware, but it's still not a standard," he says. "I suggest that people stay with approved standards and build to those specifications." However, he adds, "they should go into it knowing that three years from now, they'll at least have to do some massive software upgrades and possibly some hardware upgrades as well."

Lairamore isn't in a hurry for ATM, anyway. "Communications technology is outstripping our hardware," he says. "You can only run a hard disk so fast. I'm running 150 megabits to servers, and that's faster than the server in most cases. Why would I need 155 megabits to the desktop?"

Long sees a reason why desktop ATM may gain acceptance—connectivity. "Everybody wants to connect to everybody else, no matter where they are," he says. "ATM will be able to provide connectivity similar to the way you use telephone systems. If people really want an information superhighway, I think you'll see ATM down to the desktop someday. It's a connectivity issue, not a high-bandwidth issue."

Nolle says that ATM presents something of a dilemma today. "While ATM transport infrastructures are clearly better than non-ATM transport infrastructures, the difficulty is that we don't need ATM at the moment. However, we are going to need it at some time in the not-too-distant future," he explains. "If we buy it today, we have to reconcile something that we don't need with a bunch of applications that ran very well without it.

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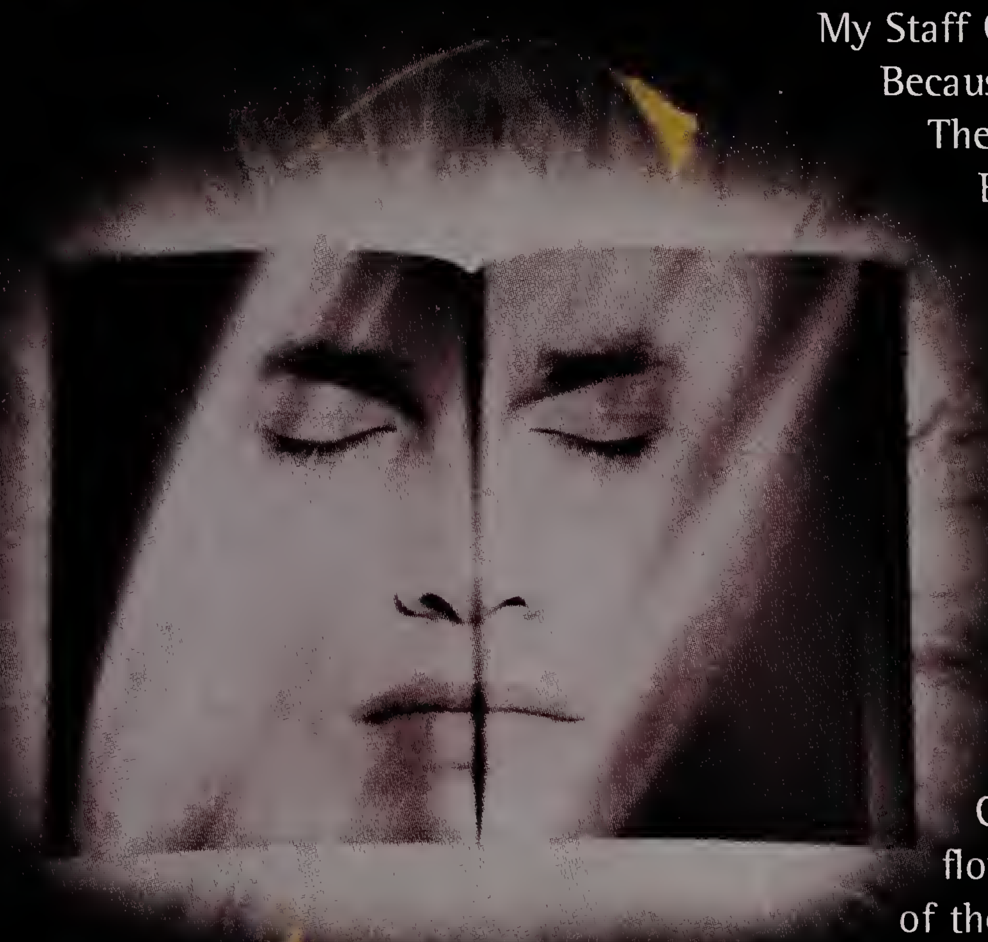

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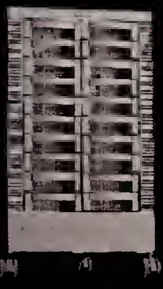

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Stone & Webster Engineering Corp.

Boston

A feasibility study convinced Stone & Webster to stick with its current network and forget about broadband communications for the time being. An engineering and construction firm, Stone & Webster takes on big projects—building process-manufacturing plants such as oil refineries and power plants as well as roads and highways for municipalities. The company has more than 20 offices in North America and a facility just outside London, and it is also engaged in some major projects in Saudi Arabia. The U.K. office has a 256Kbps fiber-optics circuit, Saudi Arabia has only dial-up phone service, and the rest of the offices are on a T1 network.

"We run video, data, voice and electronic mail on the [T1] lines in the U.S. and Canada," says Al Martino, director of corporate telecommunications. "I thought we should be able to get a better price and more use of our circuits if we could go to frame relay." He had AT&T do a study and found that the cost associated with the SNA-compatible routers necessary to support the network would outweigh the benefits of converting to frame relay.

"We looked at frame relay as a stepping-stone on the way to ATM," Martino says, "but it didn't turn out that way. I would dearly love to go over to frame relay, for more variety of speeds and lower cost. But for now it doesn't look good."

If we don't buy it today, we're going to have to throw away part of whatever we do buy if it turns out in the future that we need ATM."

The way some companies are dealing with this dilemma is to prepare a place for ATM without actually buying it now. One way is with SONET, which can carry fast-packet traffic now and ATM traffic in the future. SONET does not replace ATM, however. "SONET provides the physical means for transporting data," Kessler explains. "People have asked me, 'Why would I want ATM? I can get SONET instead.' My reply is, 'That is comparing apples to horses. Think of ATM as the boxcars filled with user data; think of SONET as being the tracks along which the boxcars run.'"

The good news is, there's no need to hurry. "If you've got a network that still has useful life on the books, unless you're one of the relatively small number of companies who really are ATM-demand-driven, you might want to stay where you are," Nolle says. "When your network comes up for modernization, it's very important that you invest in technology that is at least ATM-compatible. A SONET commitment is probably a safe near-term commitment. Nobody should buy anything above the T3 level that isn't SONET. In fact, nobody should buy anything at the T3 level that doesn't have a SONET migration strategy," he adds.

Preliminary steps to broadband communications, then, involve basic good planning. "Look at your business need," says Lairamore, "and don't bet on the forecast of things to come."

Caroline Michel, research manager at International Data Corp., a Framingham, Mass., market researcher (owned by the same parent company as *CIO*), suggests that CIOs conduct a thorough analysis of present bandwidth use and project what future applications are likely to require. Furthermore, she notes, "You want to make sure that your vendor is working closely with the standards bodies. If they are developing their own proprietary ways of switching and interfacing, it still might not shut you out from future migration, but currently it might limit the interoperability with other kinds of equipment. So, you want to spend a good long time talking to your equipment vendor."

An honest assessment of the risks is a prime factor in undertaking a migration to broadband communications, says John Richo III, executive vice president for MIS at CPMS in Los Angeles. "In any development project involving cutting-edge technology, it is important to have a clear vision of what you are trying to accomplish—and why. You also need the backing of top management," who must understand that the initial assessment may find that the project actually isn't worthwhile, he says.

Nolle has an encouraging word for CIOs beginning to think about broadband technology. "I've never seen anybody really fail at broadband," he says. "I've seen organizations start off on broadband projects and find themselves unable to execute. They inaugurated an RFI [request for information] or RFP process thinking that they were going to get all kinds of compliant products and live happily ever after. What they found is that the actual state of the products is short of what they need, or the prices are higher, and they're unable to build the justification." But that's not failure, he points out. "A failure is when you start spending money."

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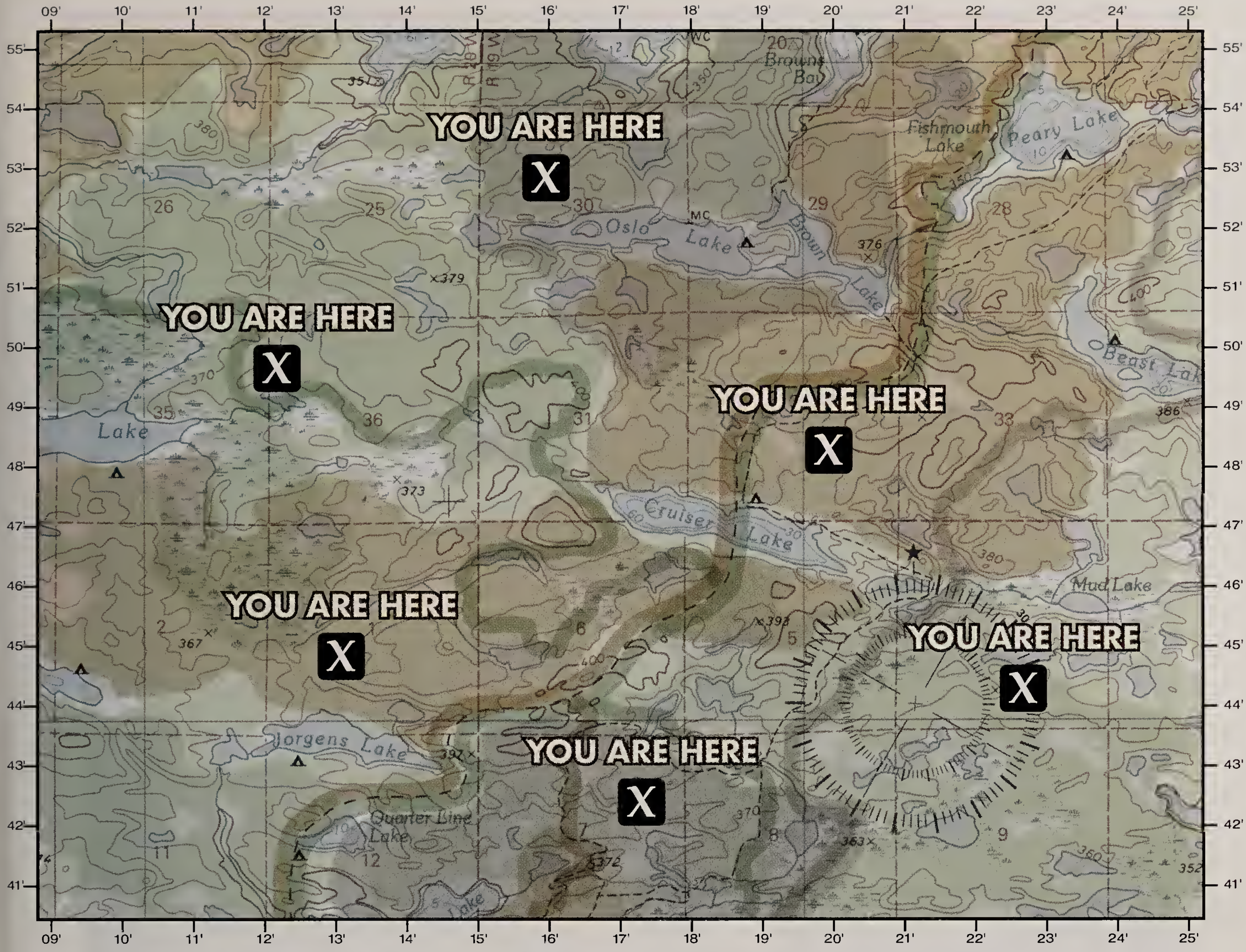

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Harvard professor Steven Kelman holds that excessive regulations are the real cause of the government's procurement woes. Now director of the Office of Federal Procurement Policy, his mission is to make the government's acquisition process look more like the model used in corporate America.

A New PURCHASE *Order*

BY LEIGH BUCHANAN

If you think the federal government's procurement system is screwed up, you're right, but you probably think it for the wrong reasons. All those stories about $600 toilet seats and $800 hammers that made headlines in the '80s conjured up images of bureaucrats with itchy backs shoveling taxpayers' money at greedy contractors with long fingernails. But in fact, the procurement system's woes result from a completely different situation, one in which officials are so straightjacketed by mandates for fairness that not only can't they make crooked decisions, they can't make smart ones, either.

Steven Kelman ferreted out this truth while interviewing government and corporate computer managers for his book, *Procurement and Public Management: The Fear of Discretion and the Quality of Government Performance* (The American Enterprise Institute Press, 1990). A professor of public management at the John F. Kennedy School of Government at Harvard, Kelman wanted to know why government spent more than industry for comparable products and services and why public-sector computer managers generally expressed less satisfaction with vendor performance than did their private-sector counterparts. He concluded that excessive regulations designed to promote competition had rendered government procurement managers unable to use pertinent information or exercise common sense in awarding contracts. Even an agency's past experience with a vendor—good or bad—was excluded from the criteria managers could use in their decision making. In essence, John Adams' "government of laws, and not of men" had run amok, to the point where poor performers often beat out superior ones for the government's business.

Kelman's book impressed Vice President Al Gore, whose much-ballyhooed National Performance Review targeted just such government waste and stupidity. In 1993, he named Kelman director of the Office of Federal Procurement Policy and charged him with making the government's acquisition process look more like the corporate model. So far, most of Kelman's efforts have been received favorably by the procurement community, although detractors still hoot at the notion that so entrenched a system can ever be substantially changed. Senior Editor Leigh Buchanan met with Kelman in his Washington office recently, to find out how his vision was holding up.

PHOTOGRAPHY BY KATHERINE LAMBERT

"One of the unique features of government procurement is that decisions can be protested. It's as if Proctor & Gamble decided to go with Compaq and IBM took it to court."

CIO: *The Office of Federal Procurement Policy has never exactly been a hotbed of reform, and when you presented your plans for turning the agency on its head, a lot of people were understandably skeptical. Here's this guy from academia, with no real hands-on procurement experience, attacking not only written rules but also a longstanding culture that values safety over excellence. Now that you've been here a little over a year, have you actually seen any change in that culture?*

KELMAN: One of the real surprises to me in coming to Washington has been the extent to which there exists at least a constituency for change. The procurement community has a reputation for conservatism, and certainly elements of that remain. But a lot of people had already come to the realization that the system had gotten out of control, that it was excessively regulated and just didn't make sense. The senior-level endorsement from the vice president and the National Performance Review has legitimized that view and allowed it to come out in the open. Now I think there's a feeling that procurement is in the front lines, that for the first time it's being seen as taking leadership on something rather than being a backwater.

CIO: *But is the new eagerness for reform playing out in the way people do their jobs?*

KELMAN: There are some changes. When I did my research on the book back in 1988, I never once, from any of the career procurement people I spoke to, heard the word "customer" used to describe the taxpayer or the program people on whose behalf they were purchasing. Now when I go out and talk with mid-level career people, the word "customer" isn't on everybody's lips, but you do hear it. And when I visit their offices, I see books on total quality management and customer satisfaction on their bookshelves. It's conceivable they put them out for my arrival, but I don't think so.

CIO: *Can the model those books describe realistically work in the government? You've talked about giving people "unbridled discretion" to make decisions, and management theory says that part of that is giving them permission to fail. But failure in the federal-procurement process can have major repercussions, especially if it is construed as resulting from corruption or as wasting the taxpayers' money.*

KELMAN: There's a poor risk-reward ratio in the government, and you're absolutely right that it is a systematic problem in trying to improve the management of the public sector. It's seen as a punitive environment, and the upside isn't as great as in the commercial world. Senator [John] Glenn raised this issue last year, and I said to him, "The best thing you can do to bring about this change is hold a hearing sometime focusing on people who have done a good job rather than just holding hearings on people's failures." And Glenn looked at me, and he pointed at the press people in the hearing room and said, "I'd be happy to, but none of them would show up." So, I think a lot of the punishment-related environment of government management is created by the audit environment and the media environment. It's a real problem.

CIO: *Is there anything you can do about it?*

KELMAN: One thing we've done is instituted what I like to think is an innovative idea called "pledging." Instead of central management coming out with policy pronouncements or directives emanating from the White House to a breathlessly waiting world, we wanted to get agencies to commit as a group to making concrete changes around specific procurements. The idea was that if a group of people did it together, with a high-level endorsement, it would reduce the risks. We hoped that the people involved in these projects would learn some lessons from them and would then become ambassadors within their organizations for spreading change further.

CIO: *I know that a number of agencies pledged last year to consider past performance when evaluating vendor proposals. This, of course, was one of the main points in your book: that it's absurd to discourage procurement officials*

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from considering their agencies' experience with a contractor—whether it's good or bad—when awarding new contracts.

KELMAN: Yes, because the fear has been that that will allow bias to enter the system because officials can then pick and choose the information they will allow. So, someone who has given poor performance may get a new contract from the same agency, and someone who has performed well may not. And what that does is it disincents companies from doing anything more than the minimum because they know they won't be rewarded for it.

CIO: *So, how has the new approach worked out?*

KELMAN: I am somewhere between cautiously and relatively optimistic that this is going to work. About 10 contracts have been awarded so far, with the largest being a big Immigration and Naturalization Service procurement to modernize the agency's use of IT in the field. And the idea seems to have caught on. In fact, a lot of people say they're not waiting for the pilot to be over—they're going ahead and introducing past performance as an important selection criterion in a number of procurements.

CIO: *But there are problems?*

KELMAN: There are still two big question marks. Number one, are people going to be willing to give bad grades when they give references? Unlike in the commercial world, where somebody might call up two or three of their friends who have the same vendor and say, "Gee, how did these guys do?"—and it's all very informal and private—in the government, the rating that a customer gives a vendor will be available to that vendor, which will be allowed to put its own comments into the system. And while vendors can't protest an individual rating, they will be able to get it reviewed at one higher level of the organization. I'm afraid that in that environment, the easiest thing will be to just give everyone more or less the same grade.

CIO: *Doesn't the new subjectivity also increase the threat of litigation? That's what the old regulations were supposed to protect you from, right?*

KELMAN: Well that's the second problem, because the vendor may still say the information was evaluated incorrectly. One of the unique features of government procurement is that decisions can be protested. It's as if Proctor & Gamble decided to go with Compaq and IBM took it to court. It's something totally unknown in the commercial sector but part of everyday experience in government.

One of the problems with this environment where everything can be protested is that it encourages conservatism in the system. Nobody ever gets protested for giving the award to the low bidder. Nobody gets protested for doing things the way they've always done them. It's when you innovate and try to change that people feel their exposure to protest goes up. It could very well subvert the program.

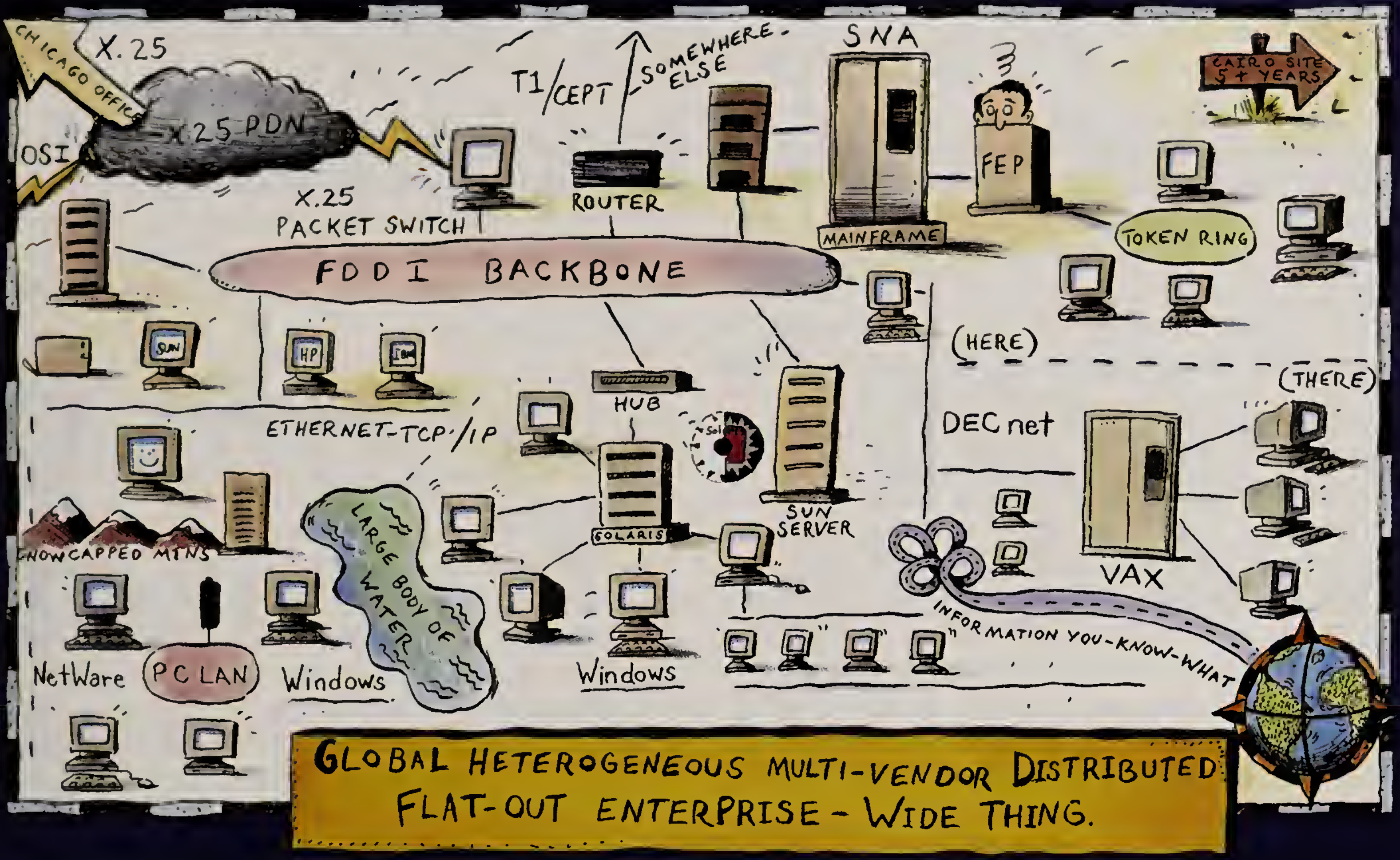
CIO: *Have there been protests yet of any contracts that have considered past performance?*

KELMAN: We now actually have the first bid protest on an IT contract. It involves a local area network procurement by the Air Force, where past performance was used as a discriminator in giving the award to TRW rather than Unisys, and Unisys has protested. As to how it will come out, we'll have to wait and see.

CIO: *It seems to me that looking at past performance—while an eminently sensible suggestion—would further bog down the acquisition process, which people already complain is too slow. Since the goal of the National Performance Review is to streamline, how do you keep the new requirements from becoming administratively burdensome?*

KELMAN: It would be a big mistake simply to add on past-performance evaluations to an already-overburdened and excessively complex process. As your com-

"This is in the interest of any quality vendor. It's the way any vendor that is active in the commercial marketplace is used to doing business, and it's the way the free-market system works."



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©1995 Sun Microsystems, Inc. Sun, the Sun logo, SunSoft, Solstice and Solaris are trademarks of Sun Microsystems, Inc. All other trademarks are property of their respective owners. SLSTIB mercial readers are unlikely to know, we have an incredibly complex source-selection process with huge levels of evaluation criteria, gargantuan proposals and gargantuan committees that meet for literally months to evaluate these gargantuan proposals. A significant part of what the government tries to do with these proposals—which are often written by professional proposal writers rather than by the people who are going to do the work, so they're really essay-writing contests more than anything else—is to get some feel for how well the vendor is likely to perform. It seems to me that past performance gives us a much better prediction of that than a proposal written by a professional proposal writer.

But we should and must cut back a significant number of other elements of the source-selection process, such as these very, very lengthy management-capability proposals that the vendors have to come up with, in which they go into enormous detail about what their management philosophy is, where their offices are around the country, and who is in them.

CIO: *Speaking of vendors, how have they reacted to having their track records scrutinized?*

KELMAN: This is in the interest of any quality vendor. It's the way any vendor that is active in the commercial marketplace is used to doing business, and it's the way the free-market system works. There certainly are some vendors out there that have specialized in trying to sell to a market where their performance is not evaluated in the same way as in the commercial world, and some of them will have to shape up or ship out. But by and large, the responsible major players have been favorable to this initiative.

CIO: *But vendors will have to change, to some extent at least, the way they market to the government?*

KELMAN: Vendors to government markets have gotten used to the emphasis on judicial review and due-process protection and so forth that goes far beyond anything that exists in the commercial world. As the government redirects itself more in a commercial direction, I believe vendors that sell to the government should take a lesson from the way their commercial divisions serve the commercial world and try to overcome their addiction to the minutiae of due process and the tendency to sue first and ask questions later.

CIO: *What about smaller vendors and startup companies that don't have a track record? What are you doing to protect their interests?*

KELMAN: We need to make sure that high-tech startups in IT and other businesses have a chance to get their foot in the door. There are several ways to do it. Number one, let them start with small contracts. We are pushing, certainly as an initial phase, more attention to past performance on the larger contracts. So, if I were a government customer, I would try to find ways to let a new startup come in on a very small contract and develop a track record. Second, the fact that we're encouraging customers to look at commercial as well as government references should allow people to enter into a government market. Third, past performance is not going to be the only criterion. Just as in the commercial world, where a startup may partly be competing on price, we should expect the same thing in our environment. And fourth, the key managers of a startup often have significant experience with larger firms, and they may be able to give information about the kinds of projects they led there.

CIO: *At one point there were plans afoot to rewrite the Federal Acquisition Regulation, which as I understand it is a 1,600-page behemoth that took years to write and exemplifies the overregulation that you're hoping to eliminate. Not surprisingly, a lot of people have said that was biting off more than you could chew. Is substantially revising the FAR really an achievable goal?*

KELMAN: There are a number of changes that can and should be made in the FAR. At the same time, I have become increasingly convinced that we've done it to our-

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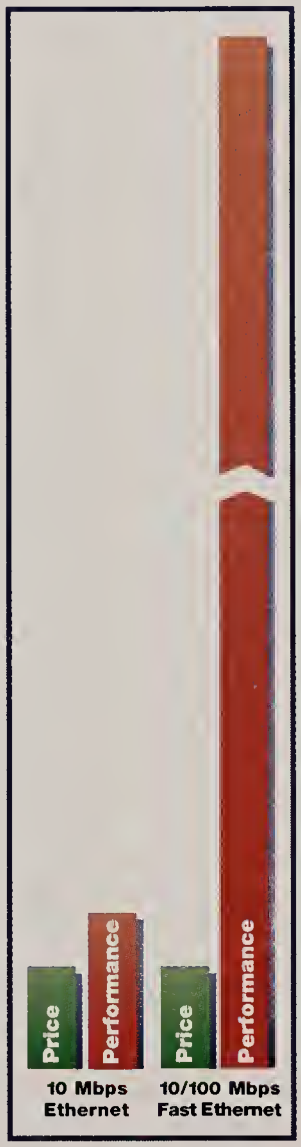

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> *"If government procurement were dominated by people who came out of business schools rather than law schools, the virtues of local judgment and local discretion by people on the ground would be more appreciated."*

selves. If you look, for example, at what's in the FAR on source selection, there's only seven pages. A lot of the very, very complicated procedures that lead the government to take two or three years to make a major IT acquisition don't come from statute but from a climate of caution and double-checking that grows out of the spirit of the system. The ability to defend yourself against protest, the idea of opening up competition to everybody, has led us to add on more and more layers of review, more and more bureaucratic approval steps, more and more complex specifications, and more and more evaluation criteria.

CIO: *So, you're no longer planning to rewrite the FAR?*

KELMAN: To the extent we have resources and to the extent we have time, it makes sense to reexamine the FAR. But I now believe that is not the highest priority for procurement reform. I think there are other changes—cultural, management changes—that take higher priority.

I am now intrigued with the idea of getting the acquisitions people in the trenches to have a whole series of agency-level meetings to do a sort of data dump—maybe even using the Internet—of specific ideas for ways the FAR can be changed, rather than going chapter by chapter and doing a big rewrite, which is an enormous enterprise. Let's try instead to do a quick fix of a bunch of specific things based on suggestions that come from people in the trenches.

CIO: *I've also heard the criticism, mostly from industry but also from within the government, that rewriting the FAR isn't a good idea anyway, that it would damage the predictability and uniformity of the process.*

KELMAN: Yes, well, industry does not like the idea of rewriting the FAR. The trade-off between uniformity and predictability and local discretion and local judgment is a classic dilemma in any organization. I think the preference for uniformity and predictability grows out of a legal culture rather than a management culture. If government procurement were dominated by people who came out of business schools rather than law schools, the virtues of local judgment and local discretion by people on the ground would be more appreciated.

CIO: *Even if you don't rewrite the FAR, most of your initiatives are still multiyear. Do they have a future if the Republicans take the White House in '96, as seems increasingly possible?*

KELMAN: Procurement reform has been very bipartisan. If anything, the themes that the administration has emphasized in procurement reform—deregulation and making government procurement practices more like state-of-the-art practices in the commercial world—are themes that the Republicans have a lot of sympathy for. So, I don't worry about shifting political winds leading to a change in the direction or the momentum of procurement reform.

My main worry is that the whole political process is in such turmoil and the future of these programs and agencies is in such doubt that it may create a situation where folks are spending all their time either engaged in a rearguard action to defend their programs or working on their resumes. And so much time is taken up by the rumor mill and things of that nature. It's a very difficult environment for management change to take place in. CIO

Share Your Success Stories

Steven Kelman believes one way to bring about change in government is by recognizing and rewarding success. Accordingly, he is on the lookout for procurement-related stories with a happy ending, like the tale of the mid-level contracting officer in the Department of Health and Human Services whose suggestions for cutting red tape ended up as part of the 1994 Federal Streamlining Acquisition Act. Kelman asks vendors and government employees with shining examples of procurement-process improvements to contact him at 202 395-5802 (fax: 202 395-3242).

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Freedom of Speech

Advances in voice technology and falling prices in the speech-recognition market could make voice-response applications for the telephone more prevalent. And talking to your computer may soon signal a gain in productivity, not loss of touch with reality.

BY DENNIS LIVINGSTON

Voice-processing applications are growing more interactive as computers and telephone systems become increasingly adept at recognizing and responding to human speech.

Voice-processing packages—products that, to varying degrees, store, manipulate and analyze human-speech patterns—have been moving beyond their traditional base in the voice-messaging world to encompass a more and more sophisticated array of commercial applications. In particular, speech-recognition programs formerly confined to laboratory settings or affordable only to the largest corporations are now more widely available, thanks to advances in computing power and increased competition. Digital signal processing (DSP) boards used in speech-recognition applications that three or four years ago cost $5,000 to manufacture now cost less than $1,000, according to Julie Donahue, president and CEO of BBN HARK Systems Corp. Walt Tetschner, president of Voice Information Associates in Lexington, Mass., projects the market for products containing speech-recognition technology will reach $944 million by 1998, up from $347.2 million in 1994.

As a result, companies may utilize a growing range of telephone-linked voice-response products that allow individuals with or without touch-tone phones to receive stock quotes, access voice mailboxes, place purchase orders, request account-balance information, make travel reservations and engage in other transactions. Voice dialing and the use of word commands to activate telephone functions are other popular applications. On the computer side, speech-recognition products enable users to give commands and, in speech-to-text applications, dictate documents to and enter data in desktop machines.

ILLUSTRATION BY JAMIE HOGAN

Given the array of uses for voice technology, it's no surprise that the applications themselves come in many different forms. Speech-recognition products vary by recognition technique, vocabulary size and type of speech accepted:

■ **Speaker-independent systems** can, in principle, recognize words spoken in a variety of accents. Such products generally work by comparing such characteristics as frequency and amplitude of the words users speak against those of voice-print samples of words the product recognizes. If there is a close statistical match between the user's word (a "token") and a sampled acoustic pattern (a "template"), that word is recognized. Templates are derived from acoustically processed and digitized words input by a wide variety of voices. By contrast, speaker-dependent systems are based on pattern matches between specific words spoken by an individual and the same words stored by that person in the system.

A number of techniques are used to

improve recognition accuracy. For example, language models may describe the frequency with which words occur in a given language and the probability that one word will follow another. Or instead of matching whole words, some systems look for correspondences between phonemes, which are demi-syllables or other subunits of words. Other systems use word spotting to focus on key words within a flow of otherwise extraneous phrases ("I'd like, uh, a *menu* of choices").

- **Large-vocabulary systems** recognize tens of thousands of words, while those with small active vocabularies generally handle less than 20 words but operate under fewer constraints.
- **Discrete-word systems** require the user to pause briefly after each word, while continuous-word products accept and recognize words run together in a natural flow of speech. Continuous systems can be speaker-dependent or -independent.

Voice technology enables improvements in corporate productivity, employee communications and customer satisfaction.

Speech-product manufacturers make tradeoffs among all of these variables in the context of application requirements and available computing resources, according to Kurt Lynn, vice president of sales and marketing at Kolvox Communications Inc. "For instance, a voice-operated kiosk will need a speaker-independent system, while a computer command-and-control package may be speaker-dependent," he explains. "A vocabulary restricted to the digits from zero to nine plus a few key words like 'yes' and 'no' may suffice for a telephone-based recognition system, but a speech-to-text dictation program needs a relatively large vocabulary."

Similarly, although discrete-word packages are often associated with large vocabularies, continuous-speech systems usually require some constraints on the vocabulary to enable recognition. A system, for example, might limit vocabulary size, include only words relevant to a given profession or restrict input according to context, such as the phrases or numbers needed to fill out a form.

Vendors and third-party developers of voice-response, command-and-control and speech-to-text products emphasize that their tools do more than alter existing ways of doing business. They also open new opportunities for improving corporate productivity, employee communications and customer satisfaction.

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"A significant number of people have no access to touch-tone systems, find them awkward to use or have disabilities that prevent their use," says John Oberteuffer, Voice Processing Corp.'s former vice president of new business development. "Adding speech recognition to automated phone inquiry and ordering systems can enlarge the number of potential users and the percentage of call completions." He notes that national penetration for touch-tone is about 70 percent and that rotary phones are still widely used outside the United States.

According to Oberteuffer, companies can respond in several ways to information requests made via speech-recognition systems. "Output may consist of digitally recorded, natural-sounding speech," he explains. "Alternatively, word or number phrases can be spliced together, such as when you hear telephone numbers spoken by automated attendants." When a large database is supplying such information as names and addresses, however, it would be impractical to prerecord each word. In such cases, true synthetic speech produced by text-to-speech generators may be the only choice.

BBN HARK's Donahue stresses that 12-button, touch-tone systems limit access to over-the-phone information. For instance, she maintains that speech recognition is a much easier way of checking the status of your investments than punching in the names of companies whose stocks you own or waiting for an available operator. "Speech recognition augments what we do when we talk on the phone," she says.

The customer reservation system at Thomas Cook/American Express Travel is accessed by an application derived from HARK's Recognizer and Developer's Toolkit. The program lets users make hotel reservations, book cars and obtain flight information and tickets. "If you have a good idea of where and when you want to go, as is the case for most business travelers, there is no requirement for a human operator on the other end of the phone," says Donahue.

Bart Verhaeghe, vice president of sales and U.S. operations at Lernout & Hauspie Speech Products USA Inc., emphasizes the importance of dialogue models in voice-response products. For example, you might inquire about a bank's interest rates and be asked, "Would you like to hear rates for long- or short-term loans?" You reply, "Short term," and the conversation proceeds.

"The use of dialogue parallels the way people obtain information from one another. It's an efficient way to funnel input so users receive just the data they want to hear within a specific domain," says Verhaeghe.

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Nick d'Arbeloff, vice president and co-founder of Wildfire Communications Inc., contends voice-oriented products that integrate a range of speech-recognition techniques offer particularly flexible opportunities for business communications. "We set out to create a speech-recognition-based electronic assistant that could productively manage your daily phone connections, whether you are talking from your desk or using a phone in your car, in a hotel room or at the airport," he says.

Users interact with Wildfire, an electronic assistant with a constrained but natural-sounding prompting system, in order to receive and screen calls and route them to their current location. For instance, once Wildfire announces a call, you can tell it to take a message or put the call through. After the other party hangs up, Wildfire remains in session, ready to inform you of any messages or place outgoing calls upon hearing you say a name on your phone list. Thus, at different points in the dialogue, you may be uttering speaker-independent, discrete voice commands; speaker-independent, continuous numbers; and speaker-trained names. Wildfire was developed, in part, using Voice Processing's VPro product line of recognition boards and software. System prompts are delivered via pre-recorded messages. (See "You Keep Calling Wildfire," in *CIO,* Jan. 15, 1995.)

Speech-to-text dictation systems complement, and in some cases replace, the keyboard and mouse.

Computer-based command-and-control applications are usually developed from speech-recognition toolkits that let third parties add spoken commands to existing Windows and Macintosh products. Words and phrases typically include those for opening windows, printing and saving files and implementing word-processing and spreadsheet macros.

Speech commands, however, need not be limited to those that replace traditional keyboard equivalents. Researchers at Andersen Consulting, for example, are using the Phonetic Engine 500 System Development Kit from Speech Systems Inc. to develop Talk & Touch, a prototype interface for Andersen clients that integrates speech recognition with touch screens to facilitate operation of videoconferencing systems.

"One problem with speech recognition is that everything you want to take action on has to be referred to by a name or label," says Bruce Krulwich, associate research scientist at Andersen's Center for Strategic

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A sampling of vendors and products

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BBN HARK Systems Corp.
617 873-2000
▲ **HARK Telephony Recognizer 3.0**
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Dragon Systems Inc.
617 965-5200
■ **DragonDictate**

IBM Corp.
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■ **VOICE for Windows**
■ **VoiceMED**

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● **Text-to-Speech SDK**
▲ **Speech Recognition SDK**

MOSCOM Corp.
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Speech Systems Inc.
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▲ **Phonetic Engine 500 Speech Recognition System**

Verbex Voice Systems Inc.
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Voice Processing Corp.
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▲ **VPro**

Wildfire Communications Inc.
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■ **Wildfire**

Key to Product Types:
■ = Speech-to-text and/or command-and-control
▲ = Speech recognition boards and toolkits
● = Text-to-speech

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Technology Research in Chicago. "On the other hand, mouse-level interfaces are intuitive but not expressive enough to replace the keyboard. Speech is."

With Talk & Touch, you can say a whole sentence like, "Set up a video conference with John, him and her," touching pictures of "him" and "her" as you speak. Using the touch screen for references or single commands lets the speech recognizer focus on the more important parts of a sentence instead of taking up processing power to match up names. Andersen is now working on a variation of Talk & Touch for retrieving e-mail.

Recognition technology also enables command applications for devices other than computers, such as automobile-based cellular phones. Amerigon Inc. has gone one step further with AudioNav, an automotive audio navigation system that incorporates Lernout & Hauspie's discrete-word, speaker-independent technology. Drivers avoid the need for distracting keyboards and display monitors by saying their current location and intended destination. AudioNav loads appropriate maps from a compact disc and calculates the optimum route. The system then describes legs of the route in response to driver commands, such as "next."

Speech-to-text dictation systems provide an alternate route to computers that complement, and in some applications replace, the keyboard and mouse. For example, Kurzweil Applied Intelligence Inc.'s VOICE for Windows is a discrete-word, large-vocabulary product that can be used to navigate the Windows operating system and Windows applications, as well as to enter data and create text in popular Windows applications. The system is speaker-independent out of the box, and recognition is further enhanced as it gradually adapts to the user's voice and language patterns. Performance can also be improved through brief training sessions. Dictation speeds of 40 words or more per minute are possible, according to Harley Rosnow, Kurzweil's director of product management. The product considers context when receiving dictation, giving each word its appropriate spacing and capitalization. "The cost-effectiveness of such a product is apparent when it is used by hunt-and-peck typists and people who are suffering from repetitive-stress problems from typing too much," says Rosnow.

Word-by-word dictation is not always necessary with some products developed for specialized markets. Kurzweil's VoiceMED is a clinical reporting system that allows physicians to enter data efficiently and consistently and create legible, machine-readable reports. The product contains modules for emergency medicine, radiology, pathology and other disciplines.

VoiceMED's built-in medical knowledge obviates the need for literal dictation, memorization of arcane codes or working through complex menu hierarchies. For instance, the system calls up a relevant form upon hearing a radiologist say "normal mammography." The physician can use short phrases to create standard responses in the report, which then becomes part of the patient's medical record.

VoiceMED exemplifies the progress of speech-recognition technology in recent years. However, as Jackie Fenn, research director at the Gartner Group consultancy of Stamford, Conn., notes, applications are "still largely structured and task-focused. The holy grail remains systems that allow speaker-independence, large vocabulary, unconstrained grammar and continuous speech, thus approaching dialogues modeled on natural human communication."

Dennis Livingston is a freelance writer based in Brookline, Mass.

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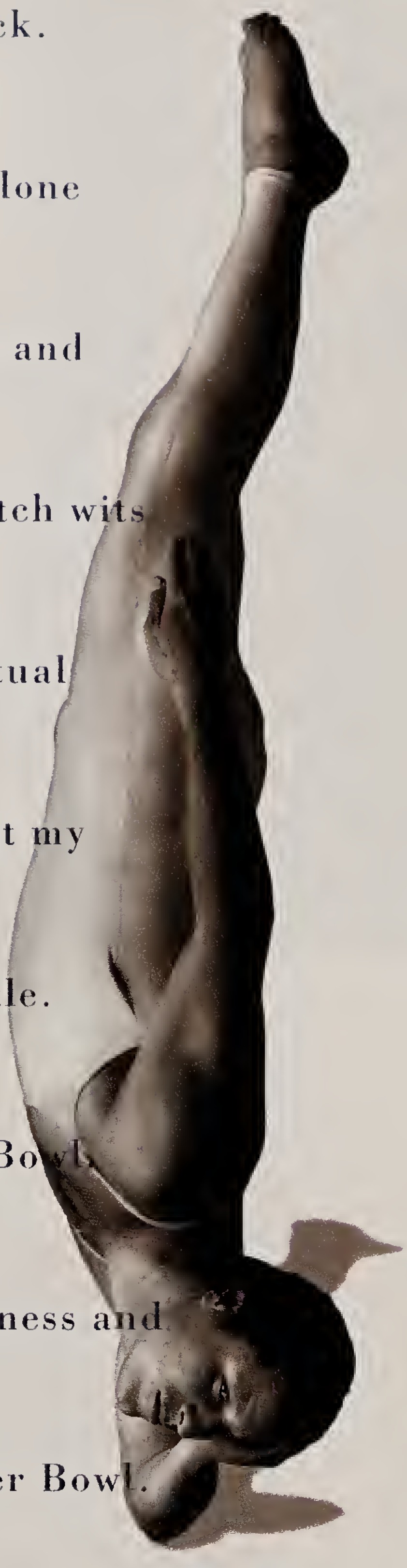

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Power to the Printers

Network managers looking to take command of printing resources need look no further. Xerox Corp.'s Print Services Manager is server-based software that provides enterprisewide connectivity between clients and printers and control over various printing capabilities.

The first version of the software, scheduled to ship this month, runs on IBM RS/6000 workstations and links MVS mainframes with Xerox high-end printers on SNA or Token Ring networks. Subsequent versions will also link up with PCs as well as midrange computers and printers of various sizes from Xerox and other vendors.

The Xerox software offers such management features as the ability to schedule and route jobs to multiple printers and provides remote printer control from a single location on the network. An optional module allows printing resources (such as fonts, forms and page definitions) to be stored on the server rather than on the more limited printer memory; they can then be downloaded to the printer as needed. Another option, Xerox Print Accounting Manager, collects usage data from printers and servers for use in resource accounting and charge-back billing. The data can be plugged into third-party accounting packages for analysis, giving users a way to keep tabs on printing costs.

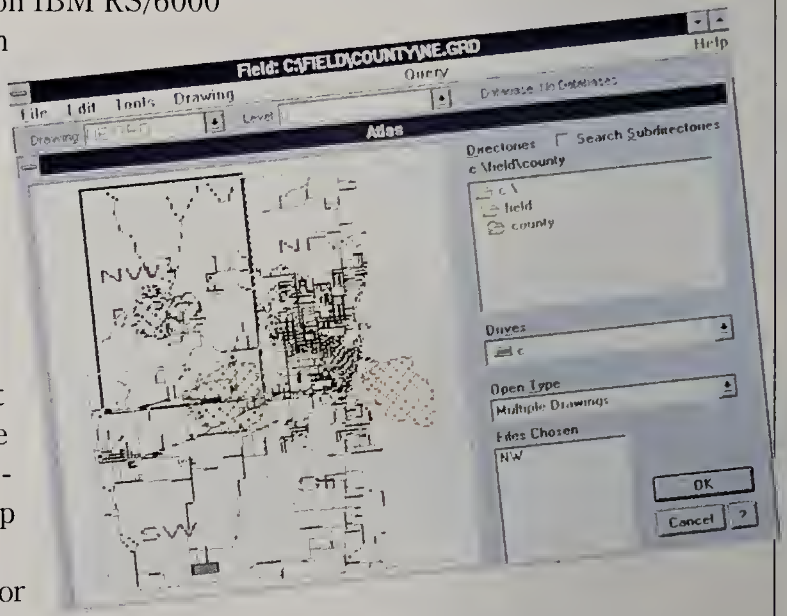
Pricing for the basic Xerox Print Services Manager starts at $25,900. For more information, Xerox can be reached in El Segundo, Calif., at 800 ASK-XEROX, Ext. 979A.

Distributed Discipline

Information systems practitioners continually gripe that there's no discipline in the distributed environment, at least nothing approaching the robust and reliable controls common in the mainframe world. Fujitsu Computer Products of America Inc. hopes to help solve at least the storage-related part of the problem with DynaSERVE, its intelligent storage-management server specifically for heterogeneous networks. Network administrators can configure the built-in software to monitor network data capacities and reallocate data to archival storage when capacities near their load limits. The intelligent system will also perform automatic data-backup duties as specified during initial configuration. DynaSERVE supports all Unix-based clients as well as personal computers in Novell environments. The refrigerator-size box, which repackages technologies from several vendors that would be more costly to acquire individually, lists for $190,000. Contact Fujitsu in San Jose, Calif., at 800 626-4686.

Not So Far Afield

Lugging around large maps and technical drawings has long been a necessity for field workers who toil on shop floors or at remote construction or utility sites. Now Bentley Systems Inc.'s MicroStation Field offers remote workers a visual mobile information system that is not only able to provide immediate access to central engineering information but also integration with corporate databases.



Using a laptop or pen computer, workers can access and graphically view engineering drawings, maps, Global Positioning System data and photographs on-site. MicroStation Field can also boost worker productivity by allowing the automation of error-prone field activities; the product can be used to draw and edit diagrams as well as collect data electronically with forms-based data fields.

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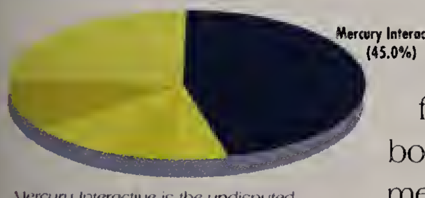

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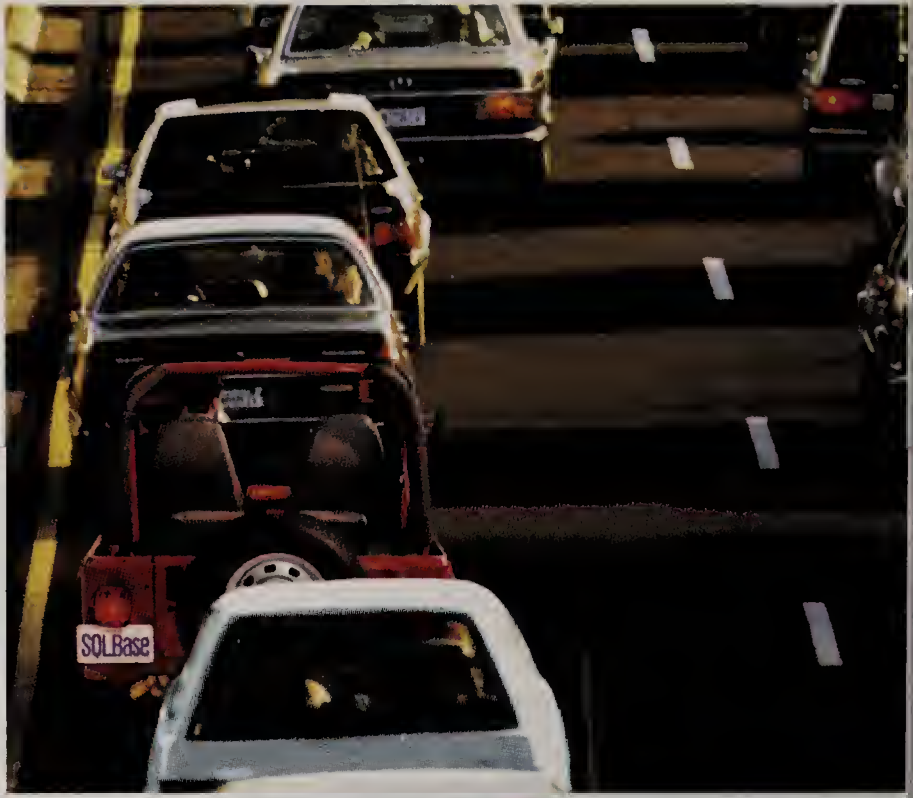

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greed facilitators, the management team tossed around a number of ideas: exploding water coolers to discourage employee socializing, telephone receivers with steel knitting needles that pop out during personal calls. Finally, perseverance, an open bar and (most importantly) *out-of-the-box thinking* resulted in true inspiration.

Realizing that too many meetings drag on interminably, the company created a suite of conference-room furniture that grows hotter the longer you use it. Once a meeting exceeds its allotted time, specially designed heating coils installed in the seat of each chair ratchet up one degree per minute. To discourage long-winded types, chairs can be programmed to heat more rapidly the more their occupants talk. The product line, called "Meet and Heat Conference Coordinates," shipped just in time for Christmas.

Unfortunately, we have no other "real-life" examples at this time, since for some unfathomable reason, very, very, very few—or possibly no—other companies have so far utilized our services. But a team of our *degreed* instructors got together and applied speculative *out-of-the-box thinking* to some problems plaguing three major American corporations. Here is what they came up with:

- *The GM Electric Car and Can Opener:* What do you do when the EPA mandates that 2 percent of your sales be in electric cars, but market research shows no one will buy the things? Throw in a little value added, of course!
- *EuroDisney America:* So what if the French are too snooty to know a good time when they see one? Pack the whole thing up and ship it back here! (Columbus, Ohio, would be a good site.)
- *USAirbags:* Stored beneath the food tray, they inflate upon impact.

If we can come up with ideas of this quality for companies that won't have anything to do with us, imagine what we can accomplish for you!

Our curriculum is built around a single rule of thumb: If it doesn't fit on a T-shirt, it's no way to run a corporation.

Seminar II. How to talk like a businessperson. What's the good of coming up with all these out-of-the-box ideas if you can't *communicate* them to the top decision-makers at your company? Corporations in today's increasingly culturally and technologically changing and fast-paced environment are like giant Towers of Babel. Senior management speaks one language, the IT people another, the manufacturing people another and the cafeteria help still another. Many gurus will encourage you to talk to senior management in business terms, but that would mean learning and possibly even understanding them. Anyway, why should you have to do all the work? And what about all the other departments? God knows you don't want to have to learn how to speak to manufacturing people about manufacturing, or marketing people about marketing!

We here at EPBSBBB have developed an ingenious solution to this long-standing problem: Corporate Esperanto. Developed especially for EPBSBBB by a crack team of animal behaviorists and linguistics students from the country's top junior colleges, Corporate Esperanto uses no words whatsoever. Rather, it is a compilation of easy-to-learn grunts, hisses, yips and hand signals, enhanced by wildly exaggerated facial expressions and the first five positions of classical ballet. Once everyone in your corporation has mastered these signs—with the help of one of our *degreed* facilitators—we guarantee that communication problems will cease to exist. (Warning: We accept no responsibility for eardrums injured by the series of piercing whistles that are the Corporate Esperantese translation of the phrase, "Please leave a message at the sound of the beep." While we're at it, we don't accept responsibility for anything else either.)

Seminar III. How to behave like a businessperson. The dominant paradigm for business behavior in today's environment, which is characterized by change (technical, cultural) and a pace (increasingly fast), is partnering—a noble concept that stresses peer collaboration and the sharing of complementary skills. Hoo hah, we say to that! Did Attila the Hun have a partner? Did Napoleon? Even in cases where partnerships have proven successful, sharing credit between two people has eroded the fame of both. Charlie Chaplin lives on as a beloved Hollywood icon, but how many of you routinely refer to Oliver Hardy as "the fat one"?

Our program meshes the overrated partnering paradigm with Darwinian theory to show executives how they can build their own success in the most satisfying way possible: at the expense of others. Each participant "partners" with another for a three-day "working-together/winning-alone" workshop. The first day, team members undergo a series of exercises designed to foster distrust (for example, one team member is told to fall backward into the arms of the other team member, who will back away at the last moment, leaving his or her partner to collapse into something unpleasant, or possibly painful, depending upon the *degreed* facilitator's mood). The teams then embark on a two-day survival exercise. But rather than rock climbing and whitewater rafting—the staples of namby-pamby corporate programs—EPBSBBB involves activities like alligator wrestling, airplane-wing walking and Russian roulette, from which we guarantee only one team member will return alive. (Course fees are *not* refundable to next of kin.)

So join us at EPBSBBB, and let us help you discover the barracuda within. Remember, success in business isn't a matter of what you know or who you know, but of how much you're willing to shell out.

Ezra Poundcake is the former crossword-puzzle editor at TV Guide *and author of* My First Business Book *(with* CIO *Senior Editor Leigh Buchanan).*

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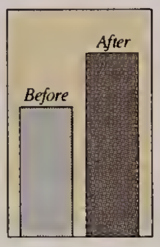

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The pace of change has gone into hyperspeed and you can't keep up. But wait! Before you turn that power tie into a noose, try Ezra's Business Seminars for Busy Busy Businesspeople. It probably won't kill you.

BY EZRA POUNDCAKE

Is your paradigm shift stuck in neutral? Has someone spread oleo on the rungs of your corporate ladder? Have you stopped questing after the key to the executive washroom and settled instead for a career in the jiffy john of mediocrity? Does your boss spell success without the "you"?

Wake up and smell the mocha, buddy! What you need is a high-octane dose of corporate smarts!

But what kind of smarts does it take to succeed in this increasingly fast-paced environment of technological and cultural change? And how do you find time to acquire them in an environment that is, after all, changing rapidly—both technologically and culturally—as well as being increasingly fast-paced? At Ezra Poundcake's Business Seminars for Busy Busy Businesspeople (EPBSBBB), it is our mission—nay, our *goal*—to transform our clients from the Curlys into the Moes of corporate stoogedom.

Our series of three courses is designed to help you think, speak and, ultimately, behave like a businessperson. We use no complicated academic constructs like that of the learning organization, which sound good in theory but take much too long to read about in practice. Our curriculum is built around a single rule of thumb: If it doesn't fit on a T-shirt, it's no way to run a corporation.

Seminar I. How to think like a businessperson. The most important skill for businesspeople to master today is something called *out-of-the-box thinking*. Scientific studies prove that people who think *in* the box miss the big picture, never push the edge of the envelope and rarely see the forest for the trees.

Consider the management team of a small office-furniture firm. When they enrolled in our program, they were committed to ergonomic design principles. But after only three days of intensive instruction in *out-of-the-box thinking,* they lost their misconceptions (not to mention the feeling in their fingers and toes). What they finally figured out was that companies don't want their employees to be comfortable; they want them to be productive. Comfort dissipates attention; pain focuses it. Just consider the torture scene in *Marathon Man*. True, Dustin Hoffman had no idea where the diamonds were, but *if he had known,* Laurence Olivier would have been much more likely to get it out of him by drilling into an exposed nerve ending than by settling him into a Barcalounger and plying him with Lorna Doones.

The challenge, then, became one of translating the pain/productivity equation into a new product category. The only two requirements: that the product at least double worker output and that it not cause permanent scarring. With the help of one of our *de-*

Continued on Page 82

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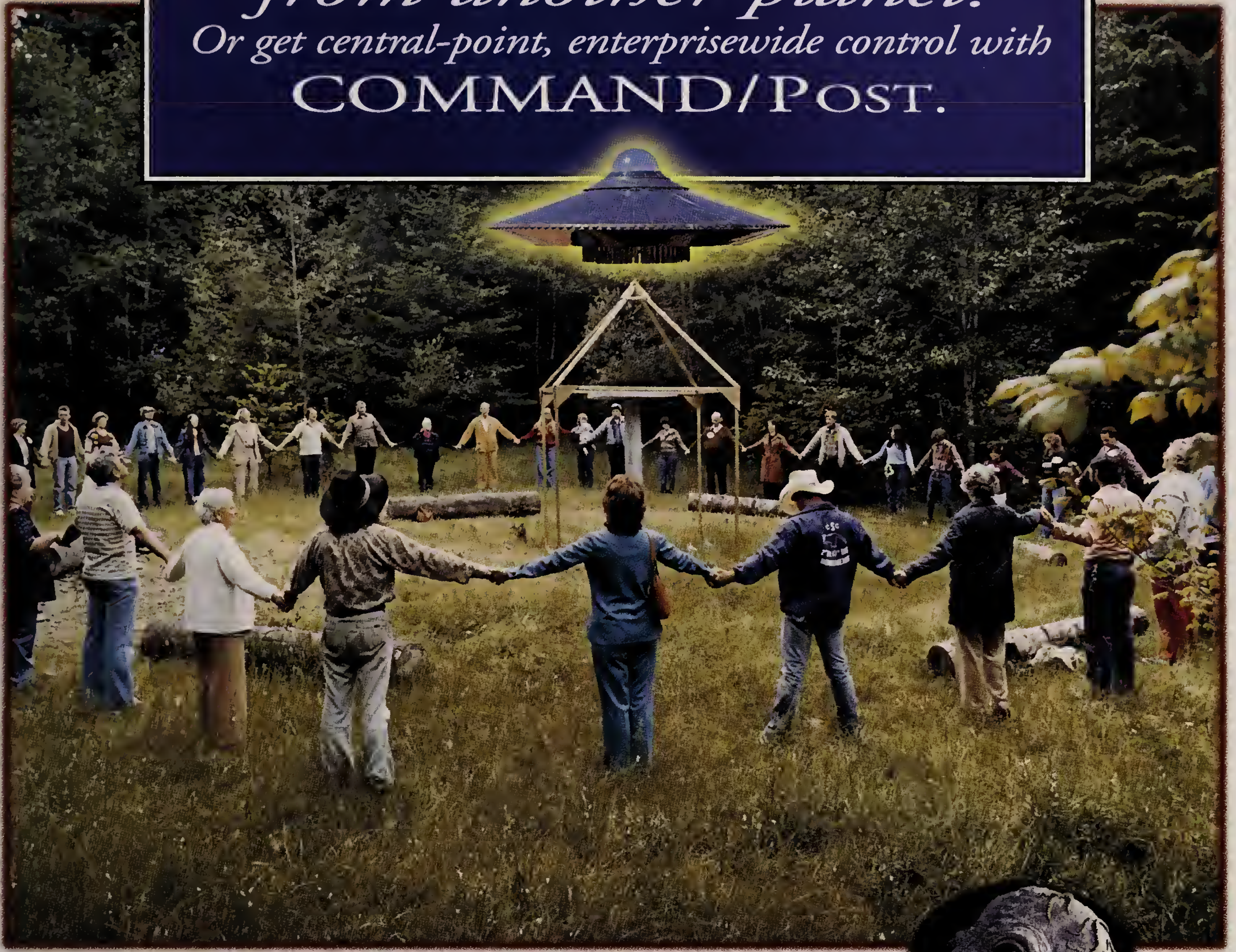

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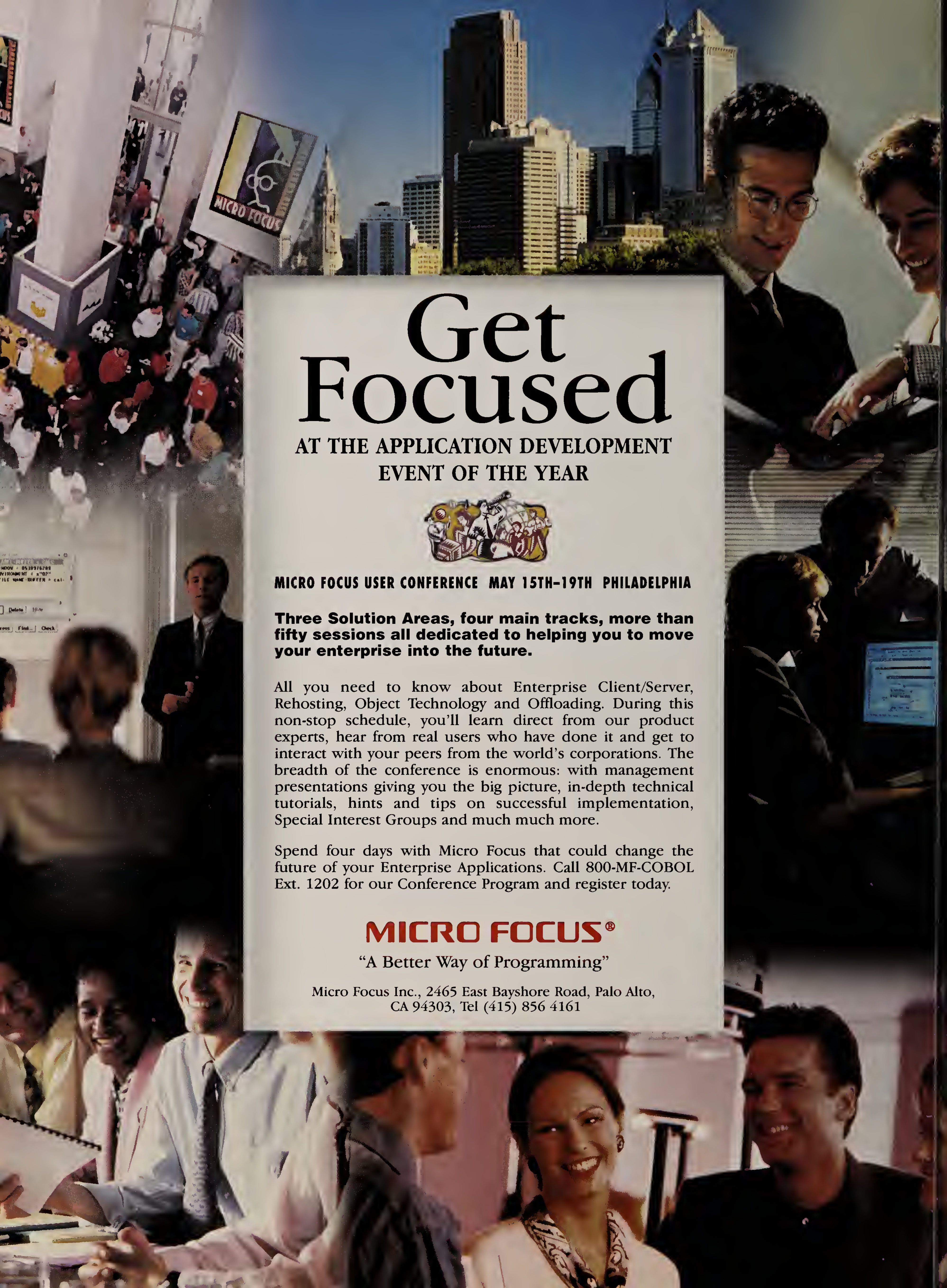

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